Portable Health Clinic Packages for BoP

Background

◆ Rapid increase of non-communicable diseases (NCDs)
  – 63% of global deaths in 2008 were due to NCDs
◆ Base of Pyramid (BoP)
  – the largest, but poorest socio-economic group
◆ Around 80% of all NCD deaths occurred in low- and middle-income countries
◆ NCD is an important problem in not only advanced countries but also BoP
◆ Need preventive medicine service for BoP
  – Of course, people of advanced countries can use the service
One of poorest countries in south Asia
  - GDP per capita: $1,883 (JPN: $35,204)

Population: 150million
  - 8th of the world (JPN: 130million)

Grameen group
  - Solving social problem of BoP people using social business etc.
  - Muhammad Yunus, CEO of Grameen, known as Nobel Peace Prize recipient
  - We, Kyushu University have a joint research agreement with them
In Bangladesh,
- Few doctors (only 50k, c.f. 290k in Japan)
- No public medical insurance
- No doctor in many village

On the other hand,
- Mobile network covers 98% of national territory
  - Also in other developing county
- Medical call center services are available
  - Difficult for doctor to give adequate advice using only voice.
- Pharmacy exists in any village
  - In many cases, strong medicine are sold without prescription

Can ICT solve these problems?
Method: Portable Health Clinic

1. Registration & Questionnaire
2. Health Checkup
3. Stratification into
4. Explanation to
5. Healthcare Guidance only to
6. Tele-consultation & Tele-prescription only to
7. Ask to repeat health checkup 2 months later to

Data Entry → Site → Dhaka

Mobile Network → Data Transmission → Master-SS → Data Center

Data Entry → Reference

Health Checkup & Healthcare

Medical

Telemedicine Center
<table>
<thead>
<tr>
<th></th>
<th>Green</th>
<th>Yellow</th>
<th>Orange</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waist</strong></td>
<td>Male: &lt;90cm</td>
<td>≧90cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female: &lt;80cm</td>
<td>≧80cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Waist/Hip Ratio</strong></td>
<td>Male: &lt;0.90</td>
<td>≧0.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female: &lt;0.85</td>
<td>≧0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Body Mass Index (BMI)</strong></td>
<td>&lt;25</td>
<td>25≦</td>
<td>&lt;30</td>
<td>30≦</td>
</tr>
<tr>
<td><strong>Blood Pressure (mmHg)</strong></td>
<td>&lt;140 mmHg</td>
<td>140≦</td>
<td>&lt;160mmHg</td>
<td>160≦</td>
</tr>
<tr>
<td></td>
<td>&lt;90 mmHg</td>
<td>90≦</td>
<td>&lt;100 mmHg</td>
<td>100≦</td>
</tr>
<tr>
<td><strong>Blood Sugar</strong></td>
<td>&lt;100mg/dl</td>
<td>100≦</td>
<td>&lt;126mg/dl</td>
<td>126≦</td>
</tr>
<tr>
<td><strong>Postprandial Blood Sugar</strong></td>
<td>&lt;140mg/dl</td>
<td>140≦</td>
<td>&lt;200mg/dl</td>
<td>200≦</td>
</tr>
<tr>
<td><strong>Urine test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Urine Protein</strong></td>
<td>-</td>
<td>±</td>
<td>≧+</td>
<td></td>
</tr>
<tr>
<td><strong>Urine Sugar</strong></td>
<td>-</td>
<td>±</td>
<td>≧+</td>
<td></td>
</tr>
<tr>
<td><strong>Urobilinogen</strong></td>
<td>±</td>
<td>≧+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pulse Ratio</strong></td>
<td>60≦</td>
<td>&lt;100 bpm (beat per minute)</td>
<td>50≦</td>
<td>&lt;60 bpm</td>
</tr>
<tr>
<td><strong>Arrhythmia</strong></td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td>None</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Body Temperature</strong></td>
<td>&lt;37℃</td>
<td>37℃≦</td>
<td>&lt;37.5℃</td>
<td>37.5℃≦</td>
</tr>
<tr>
<td><strong>SpO2</strong></td>
<td>≧96%</td>
<td>93≦</td>
<td>&lt;96%</td>
<td>90≦</td>
</tr>
</tbody>
</table>
Portable Health Clinic Package

- We developed an attaché case type package for Portable Health Clinic
- A staff brings a package to health checkup site
- The package consists of major diagnostic tools and a tablet PC, and gathers measurements using medical Body Area Network (BAN) wirelessly and automatically
- The package is battery-driven because blackout usually happens in developing country
Portable Health Clinic Package

- Pulse-oximeter
- Urine tape
- Weight scale
- Thermometer
- Blood sugar meter
- Blood pressure meter
- Tablet PC
Medical Body Area Network (BAN)

- Near field communication technology for medical and other purposes
- Approved as IEEE802.15.6 in Feb. 2012
  - High QoS and priority control
  - Ultra low-power
  - Strict security
- Collect medical data more securely compared to existing technology (e.g. Bluetooth, ZigBee etc.)
- We attached external BAN module to commercial medical equipment
Health checkup experiments in Bangladesh

Measurements

Tele-medicine

Call center doctor
Example of Prescription
Demonstration

Would you like to participate e-Health checkup demonstration?
We use PHC packages in Bangladesh

Study period: July, 2012 ~ March, 2013 (FY2012 study)
We are continuing as FY2013 study

Location: Villages (2), Factories/offices in urban/suburban areas nearby Dhaka (9)

Registration; 8527 (Male 5201, Female 3326)

Green ● 16%, Yellow ● 65%, Orange ● 17%, Red ● 2%

1003 (61%) subjects were repeated out of all orange or red (1635) subjects in the first health checkup

596 (60%) were improved at the second visit
You can see detail experiment result from

- Title: An Affordable, Usable and Sustainable Preventive Healthcare System for Unreached People in Bangladesh
- Poster Session D on tomorrow (22nd) afternoon
- Organizational culture, barriers to clinical system implementation
Thank you for your attention!