

# SMAART informatics approach to enhance chronic disease self-management

Ashish Joshi<sup>1</sup>, Ajay Anshuman<sup>2</sup>, Mahima Kaur<sup>3</sup>, Kanishk Kumar<sup>3</sup>,  
Ashruti Bhatt<sup>3</sup>, Priya Sharma<sup>3</sup>, Srishti Arora<sup>3</sup>, Harpreet Kaur<sup>3</sup>

CUNY Graduate School of Public Health and Health Policy, New York

State Uttarakhand Police, Uttarakhand

Foundation of Healthcare Technologies Society, New Delhi

# Talking Points

- Rising burden of chronic, Non-Communicable Diseases
- Describe SMAART Informatics platform
- Implementing SMAART informatics platform to enhance chronic NCD self-management: an Example Case study
- Perceived usefulness of SMAART Informatics Platform
- Discussion

# Global burden of Chronic, Non-Communicable Disease (NCDs)

- 71% of all NCDs deaths globally
- 15 million people die from a NCD between the ages of 30 and 69 years
- Over 85% of these "premature" deaths occur in low- and middle-income countries.
- Metabolic risk factors contribute to four key metabolic changes that increase the risk of NCDs:
  - Raised blood pressure
  - Overweight/obesity
  - Hyperglycemia (high blood glucose levels)
  - Hyperlipidemia (high levels of fat in the blood).

# Burden of NCDs in India

61%

of deaths in India are now attributed to Non-Communicable diseases. (Heart diseases, cancer, diabetes)

India is experiencing a growing burden of NCDs claiming over

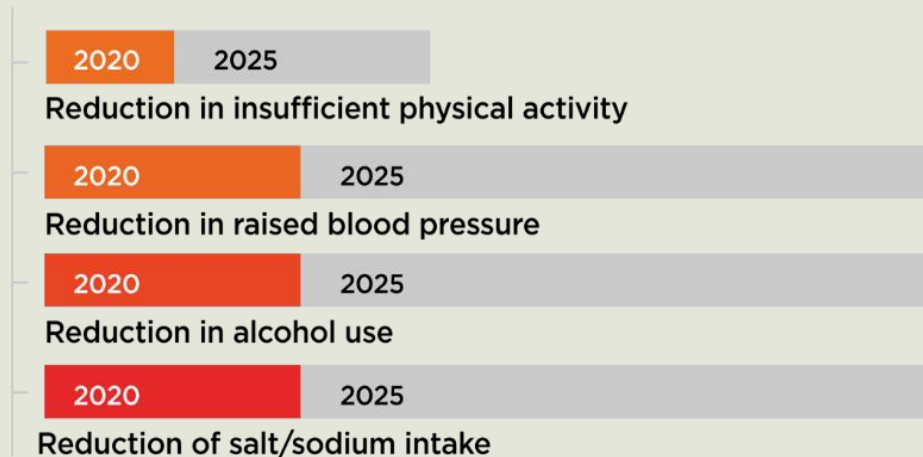
5.87million

lives in a year.

Major metabolic risk factors are obesity and raised blood pressure, blood glucose and blood cholesterol levels.



Monitoring Framework showing targets to prevent and control NCDs in India



# Background

- **Need:** Growing need of multifaceted intervention programs to reduce the rising burden of Cardiovascular disease (CVD) risk.
- **Challenges**
  - Identify at risk of Diabetes and Hypertension at early stage irrespective of symptom status and their control.
  - Lack of a robust surveillance mechanism to monitor, evaluate and guide policies and programs also contributed to the risk burden of CVD
- **Opportunity: Digital health interventions** can ensure high-quality care to people with chronic, Non-Communicable Diseases (NCDs) (World Health Organization)



# What is SMAART Informatics Platform?

- Interactive bi-lingual, mobile, standalone and an internet enabled public health decision support platform to enhance self-management of individuals at risk of chronic non-communicable diseases such as Diabetes, Hypertension, Obesity and High cholesterol

## SMAART PLATFORM INFORMATICS

Humanistic, behavioral and learning, technology enabled intervention

Sustainable  
Multisector  
Accessible  
Affordable  
Reimbursable  
Tailored



### 5 LAYERS OF SMAART

1	INFORMATION LAYER	DATA COLLECTION
2	DESCRIPTIVE LAYER	DATA QUALITY
3	PREDICTIVE LAYER	DATA ANALYTICS
4	PRESCRIPTIVE LAYER	INTERVENTION DELIVERY
5	COGNITIVE LAYER	DISSEMINATION & COMMUNICATION

Citation: Joshi A, et al. Usability evaluation of a portable health information kiosk using a SMAART™ intervention framework (2017)  
Global Journal of Health Sciences (in press)

#### Utilize SMAART Informatics Platform

- Gather Data
- Integrate multiple sources data
- Validate Data quality
- Interactive Data analysis
- Visual displays

## Implementation of SMAART Informatics platform to enhance chronic, NCD self-management: **Study Objective**

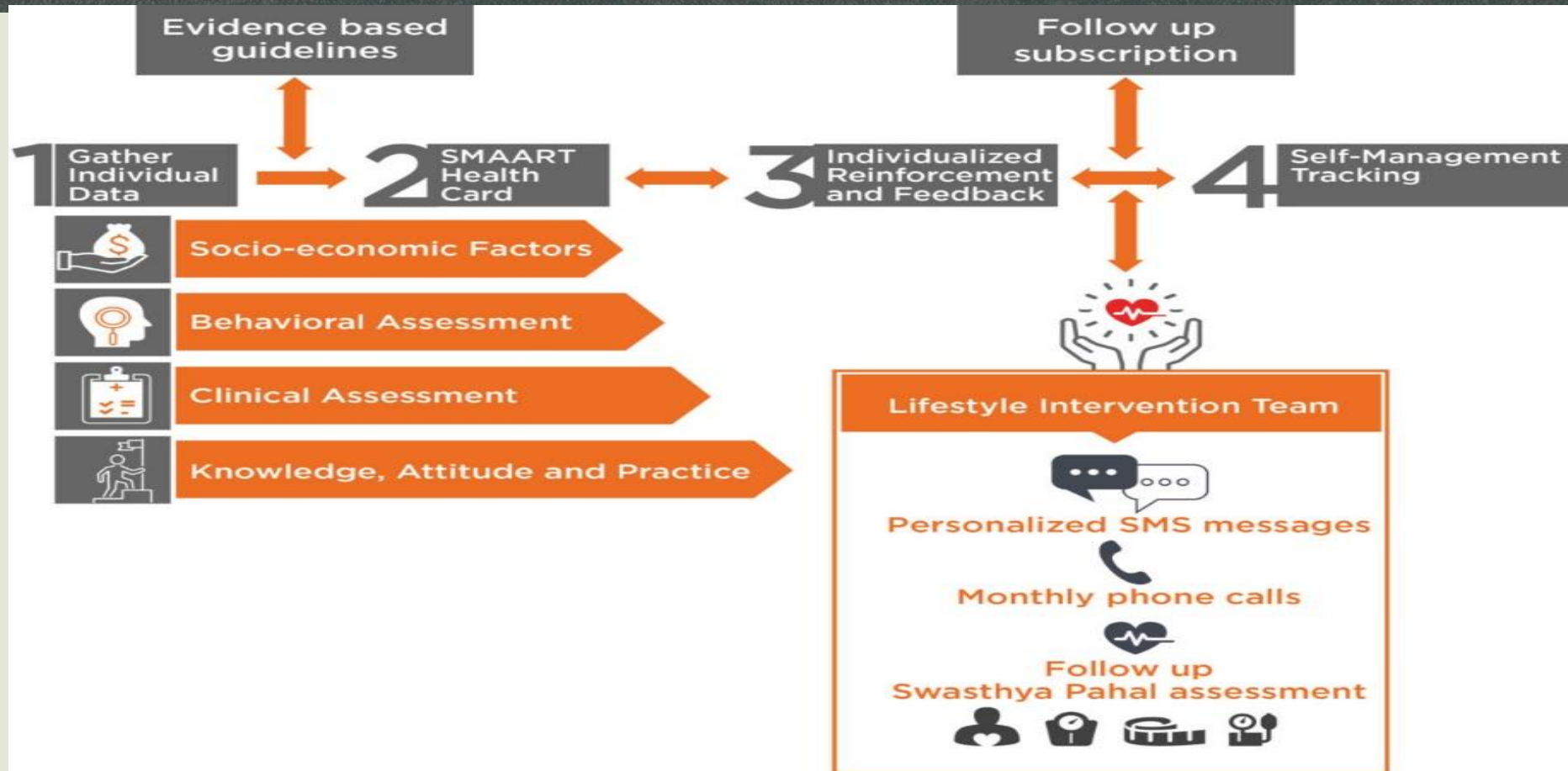
- Describe usefulness of an interactive, touch screen computer enabled SMAART informatics platform to screen individuals at risk of NCDs including diabetes, hypertension, and obesity.



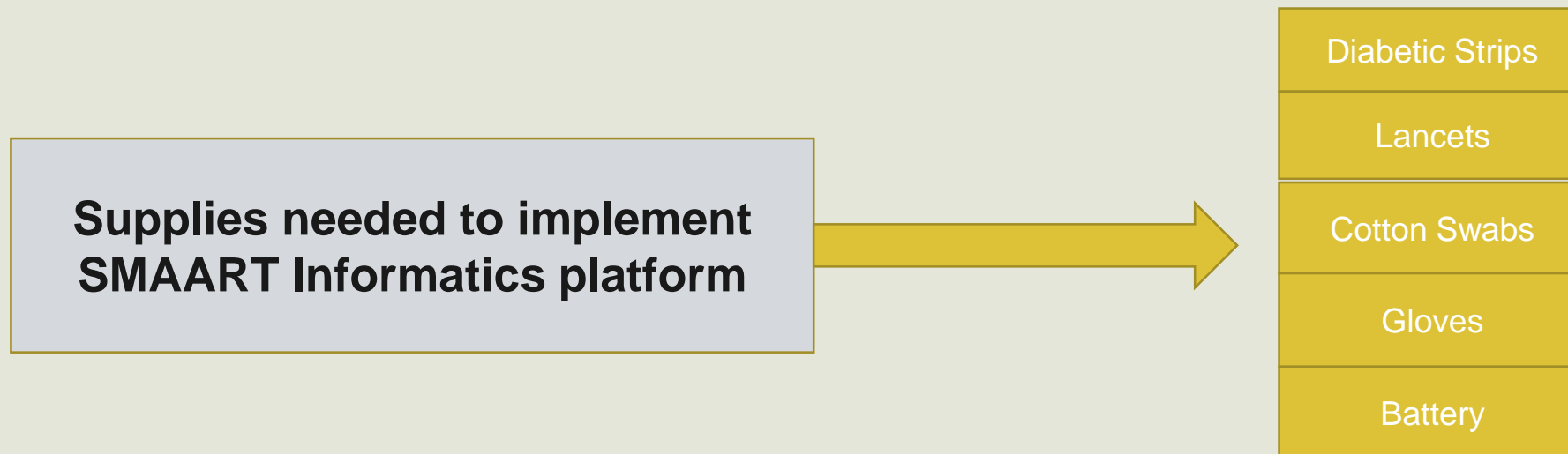
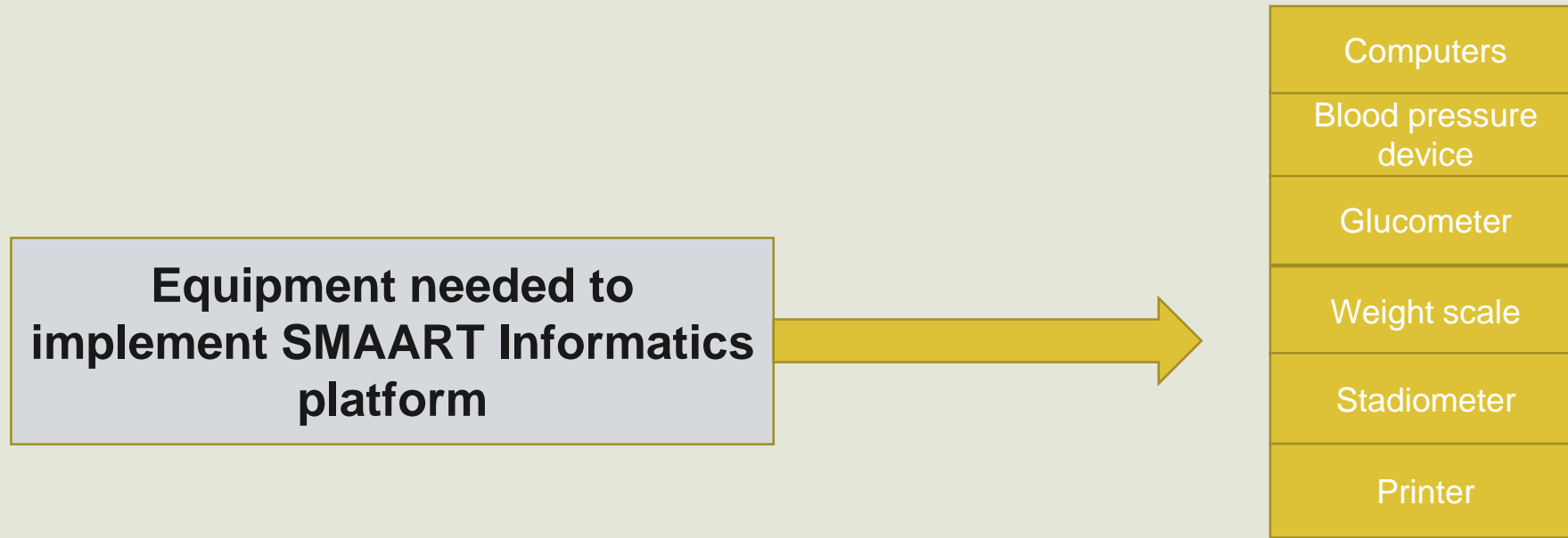
# Study Methods

- **Study location:** Police Sanchar Training Centre, Dehradun, Uttarakhand, India
- **Sample size:** Convenience sample of 64
- **Time period:** January 2020
- **Inclusion criteria:** Age 18+ years, police personnel enrolled in police Sanchar training program of the state of Uttarakhand
- **Program delivery:** Touch screen, computer-based stand alone and internet enabled bi-lingual (English and an Indian dialect, Hindi) platform
- **Preference for SMS messages:** Individuals preference for tailored lifestyle feedback through SMS messages assessed as a follow up.

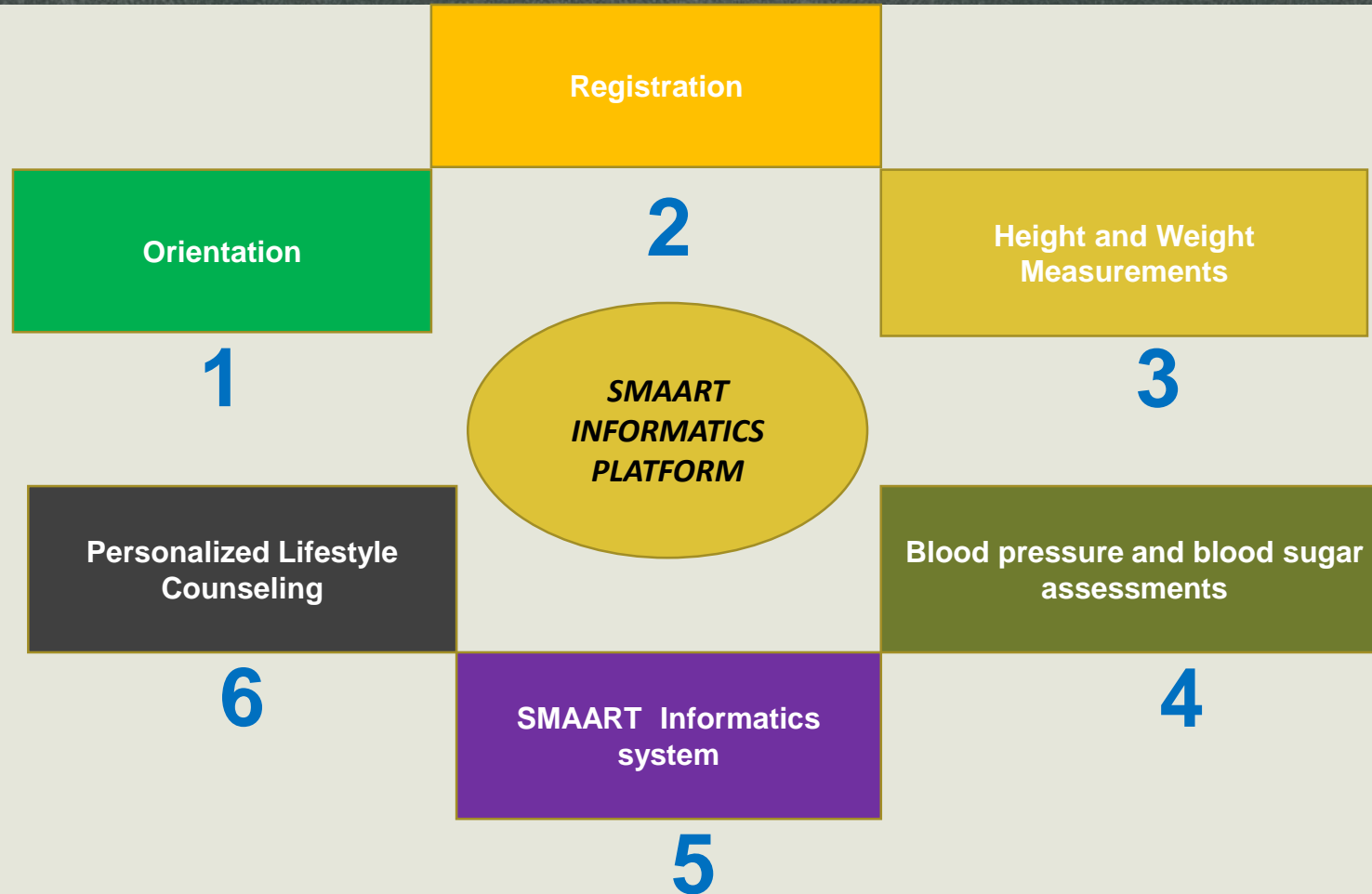
# SMAART Informatics platform




# Equipment needs for implementation of SMAART Informatics platform



# Implementation of SMAART Informatics Platform in a community setting







# SMAART™ Model

Computer ID: DEV1  
Patient ID: 6


Information About Me

My Clinical Parameters

My Height 

My Weight 

My BMI

My Blood Pressure 

My Blood Sugar

My Blood Cholesterol

## Step 2: My Clinical Parameters

Have you ever been told by your doctor that you have Diabetes / High blood sugar?

Yes

No

I don't know

Go to Next Question »


My Health Card

Health Education

Help

Settings

Exit to Main Screen



# SMAART™ Model

Computer ID: DEV1  
Patient ID: 56

Information About Me

My Clinical Parameters

My Height

My Weight

My BMI

My Blood Pressure

My Blood Sugar

My Blood Cholesterol

## Step 2: My Clinical Parameters

How do you manage your high blood pressure? Select all that apply

Medications

Diet

Exercise

None of these options

« Go to Previous Question

Go to Next Question »


My Health Card

Health Education

Help

Settings

Exit to Main Screen



# SMAART™ Model

## My Health Card


Archives

Physical Activity

no exercise

high risk

Warm up for no less than 5-10 minutes. Perform non weight-bearing activities. Duration of 20-30 minutes of exercise is recommended. Exercise at least four times per week. Cool down for 5-10 minutes to prevent dizziness, light-headedness and fainting. Avoid exercises that require lifting weights above the head.



# SMAART™ Model

## My Health Card

Archives

Print

click on any risk factor for more information

Family History	history of two or more conditions	high risk
Smoking	never smoked	low risk
Alcohol	consumed alcohol in the past	moderate risk
Physical Activity	no exercise	high risk
Body mass index	BMI is: 27.75	moderate risk
Blood Pressure	BP is: 134 / 78	moderate risk
Blood Sugar	Diagnosed with Diabetes	high risk
Cholesterol		section skipped

Continue to Education



# Variable assessment

Variables assessed include subjective and objective data including;

- Subjective self-report information
  - Socio-demographics,
  - Health behaviors
  - Clinical status
  - Knowledge, Attitudes and Practices (KAP).
- Objective data included measurements using series of physiological sensors such as
  - Weight assessment
  - Blood pressure measurement
  - Blood sugar level assessment
- Perceived ease of use: It is a 6-item questionnaire where each of these variables are rated using a 5-point Likert scale

# Perceived Ease of Use

The questions focused on;

- Assessing understandable and clear interaction,
- Flexible interaction
- Easy usage
- General easiness
- Easy learning
- Skill enhancement

# Results

- **Average Age, years:** 37 (SD=8)
- **Gender:** Males (88%)
- **Educational status:** Graduate education (42%)
- **Family history:** Hypertension (31%)
- **Body Mass Index:** Overweight/Obese (80%)
- **Lifestyle behaviors**
  - Presently Smokers and alcohol consumption: 36%
  - Self-report exercise: 62% some form of exercise
  - Walking, jogging and yoga were most common exercise types.

# Clinical Assessments

- Average random Blood sugar levels: 143 (SD=71)
- Average Systolic Blood Pressure: 140mmHg (SD=17)
- Average Diastolic Blood Pressure: 87mmHg (SD=11)
- According to JNC 8 criteria, Individuals were characterized as 8% (n=5) pre-hypertensive, 19% (n=12) stage 1 hypertension and 10% (n=7) stage 2 hypertension.
- More than half of the individuals were not able to classify themselves correctly to which category of the stage of blood pressure they belonged reflecting poor knowledge of hypertension among them.



# Preference for SMS messages

- 86% of the individuals preferred receiving SMS based health messages
- 36% of the individuals preferred to receive daily SMS messages
- 64% preferred weekly messages
- Messages related to diet, physical activity, sleep, and smoking and alcohol consumptions were perceived important.



## Discussion

- Critical challenges such as long distance from the nearest health centre, lack of transportation to health facilities, lack of awareness about health services, and high cost of seeking care can affect timely diagnosis and treatment of NCDs
- Digital health interventions can be useful way to enhance self-management of NCDs among individuals living in diverse settings.

# References

- GBD 2015 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 79 behavioral, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*, 2016; 388(10053):1659-1724
- Joshi A, Arora M, Malhotra B. Usability Evaluation of a Portable Health Information Kiosk Using a SMAART Intervention Framework. *Glob J Health Sci*. 2017; 9(8):153.
- Joshi, A., Puricelli Perin, D. M., & Arora, M. Using Portable Health Information Kiosk to assess chronic disease burden in remote settings. *Rural Remote Health*. 2013; 13 (2) 2279.

- For any questions, please contact
  - Ashish Joshi
- [Email: Ashish.joshi@sph.cuny.edu](mailto:Ashish.joshi@sph.cuny.edu)