

# Metabolic Syndrome (MetS) Among SCALE-NCD Trial Participants

## Preliminary Results

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*Pokhara Metropolitan City, Nepal*

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# Background: What is Metabolic Syndrome?

## IDF Definition — Core Components

- 1 Central Obesity**  
Waist circumference  $\geq 90$  cm (men) /  $\geq 80$  cm (women) for South Asians — required criterion
- 2 High Blood Pressure**  
Systolic  $\geq 130$  mmHg or diastolic  $\geq 85$  mmHg, or under treatment of HTN
- 3 High Fasting Glucose**  
Fasting plasma glucose  $\geq 100$  mg/dL (or HbA1c  $\geq 5.7\%$  in this study), or diagnosed T2DM
- 4 High Triglycerides**  
Triglycerides  $\geq 150$  mg/dL or on specific lipid-lowering treatment
- 5 Low HDL-Cholesterol**  
HDL  $< 40$  mg/dL in men,  $< 50$  mg/dL in women, or on treatment

## Why It Matters

**2–5x** higher risk of type 2 diabetes

**2–3x** higher risk of heart disease & stroke

**~25%** global adult prevalence (rising)



particularly high burden in South Asians

**~35%** prevalence in some South Asian populations

# Background: MetS in Nepal & South Asia

## \* Rising NCD Burden in Nepal

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Non-communicable diseases now account for over 66% of total deaths in Nepal. Hypertension, diabetes, and obesity are rapidly increasing — creating conditions for MetS.

## South Asian Paradox

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South Asians develop MetS and cardiovascular disease at lower BMI thresholds than Western populations. Visceral adiposity and insulin resistance are disproportionately high, even at normal weights.

## Urban Transition

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Rapid urbanization in cities like Pokhara is driving dietary shifts, reduced physical activity, and increased stress — all key drivers of MetS components.

## Research Gap

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Despite the rising burden, community-level data on MetS prevalence among high-risk groups (hypertensive, diabetic, smokers) in Nepal remains scarce — the SCALE-NCD trial fills this gap.

# Study Objectives

## Primary Objective

To determine the comprehensive proportion prevalence of Metabolic Syndrome (MetS) among hypertensive, diabetic, and/or daily smokers in a community-based setting in Pokhara Metropolitan City, Nepal.

## Secondary Objectives

- 1 Estimate the prevalence of each individual MetS component (central obesity, hyperglycemia, hypertension, dyslipidemia) in the study population.
- 2 Identify sociodemographic factors (age, sex, ethnicity, education, employment) associated with MetS using logistic regression.
- 3 Examine the association between behavioral factors — particularly smoking status — and likelihood of MetS.
- 4 Provide evidence to inform targeted, community-based NCD prevention and control strategies in Pokhara.

# Methodology: Study Design & Site

## Study Design

Community-based cross-sectional study

Conducted as part of the SCALE-NCD trial:  
"Scaling Up Community-Based Non-Communicable Disease Research into Practice"

## Study Location

Pokhara Metropolitan City  
Gandaki Province, Nepal

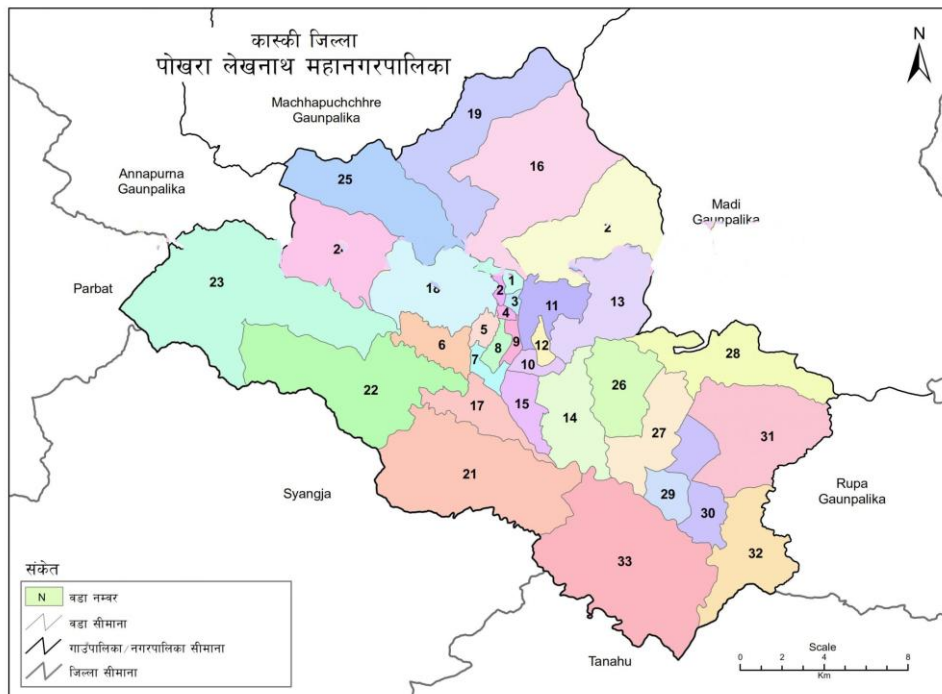
23 out of 33 wards included  
(data collection completed in these wards)

## Study Period

Ongoing (data collection complete in 23 wards as of analysis)

Preliminary cross-sectional analysis presented here

# Methodology: Study Site



स्रोत: स्वतन्त्र नक्सा (स्केल 1:50,000 / 1:30,000), मापनी विभाग र जनगणना 2068, केंद्रीय तप्यांक विभाग  
तयार पार्ने: गाउँपालिका, नगरपालिका तथा क्विप, सर्वेक्षण वा स्थापना क्षेत्रको नक्सा तथा सीमाना निर्धारण प्रयोग

Projection System: MUTM, Spheroid - Everest 1830  
LLRC, 2016

# Methodology: Participants & Eligibility

Total Sample: 1,458 Participants | Adults aged 40–75 years

## Hypertension

Prevalence:  
48.4%

### Eligibility Criteria:

- BP  $\geq$ 140/90 mmHg
- Measured on 2 separate occasions
- At least 24 hours apart

## Type 2 Diabetes

Prevalence:  
12.4%

### Eligibility Criteria:

- Fasting Blood Sugar  $\geq$ 100 mg/dL and
- Fasting Plasma Glucose  $\geq$ 125 mg/dL and
- HbA1c  $\geq$ 6.5%

## Daily Smokers

Prevalence:  
52.4%

### Eligibility Criteria:

- Had more than 100 cigarettes in lifetime
- Self-reported smoking habit
- At least one cigarette/day

*Note: Participants could belong to more than one eligibility group (hypertensive + diabetic, etc.)*

# Methodology: MetS Definition & Statistical Analysis

## MetS Classification (IDF Criteria)

**IDF 2006 Definition used** — international standard for MetS classification

**Central obesity** required (waist circumference thresholds for South Asians)

**Plus any 2 of:** raised triglycerides, reduced HDL, raised BP, raised fasting glucose

**Key adaptation:** HbA1c  $\geq 5.7\%$  used instead of fasting plasma glucose for glycemia — more practical for field settings

**Rationale:** HbA1c does not require fasting and reflects longer-term glycemic control

## Statistical Analysis

- 1 Descriptive Statistics**  
Frequencies & proportions for all sociodemographic and clinical variables
- 2 Prevalence Estimation**  
Proportion of participants meeting IDF MetS criteria; also per component
- 3 Univariate Logistic Regression**  
Unadjusted odds ratios (OR) for each independent variable against MetS
- 4 Multivariable Logistic Regression**  
Adjusted ORs for age, sex, ethnicity, smoking status, education level
- 5 Significance Threshold**  
 $p < 0.05$  considered statistically significant; 95% CIs reported

# Results: Participant Characteristics

1,458

Total Participants — 23 of 33  
wards

63.4%

Male — 924 participants

36.6%

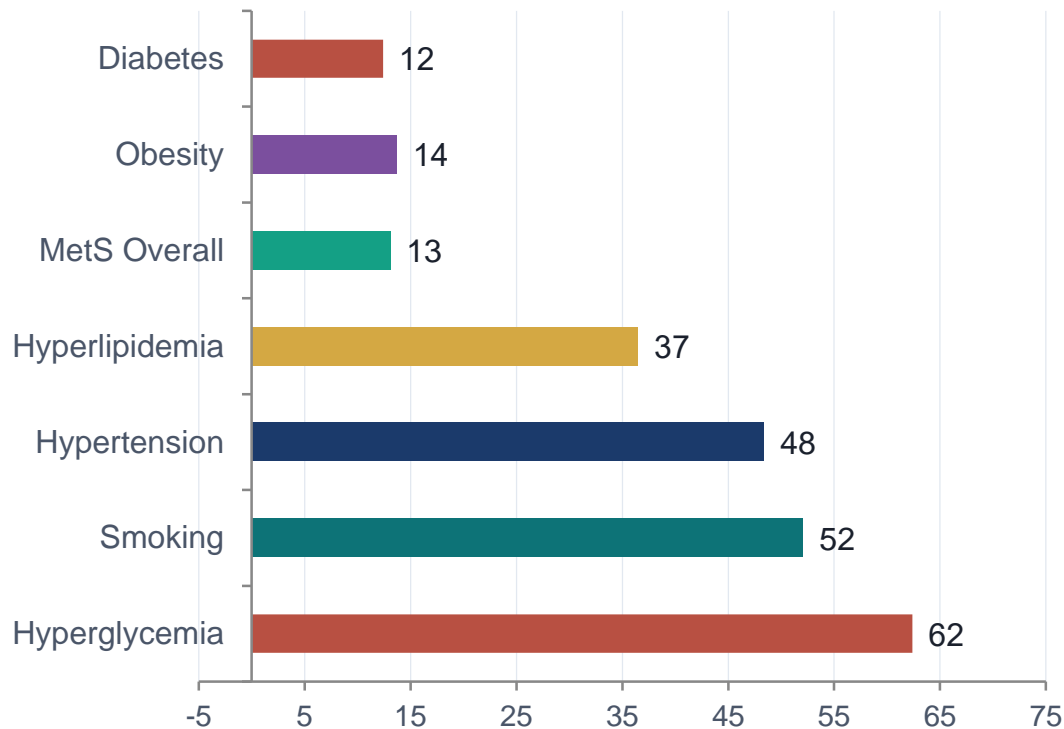
Female — 534 participants

## Sociodemographic Profile

Characteristic	Category	n	%
Age Group	40–49 years	—	Age ≥50: inversely assoc. with MetS
	50–75+ years	—	—
Sex	Male	~924	63.4%
	Female	~534	36.6%
Condition	Hyperglycemia	~910	62.4%
	Hypertension	~706	48.4%
	Smokers (current)	~760	52.1%
	Hyperlipidemia	~532	36.5%
	Obesity	~200	13.7%
	Diabetes	~181	12.4%

# Results: Prevalence of MetS Components

Prevalence of Each Risk Factor (%)



62.4

## Hyperglycemia

Most prevalent risk factor  
— major MetS driver

52.1

## Smoking

Over half the cohort —  
strongly linked to MetS

48.4

## Hypertension

Nearly 1 in 2 participants  
affected

13.1

## MetS (Overall)

~1 in 8 participants met  
full IDF MetS criteria

# Overall MetS Prevalence

13.1%

of 1,458 participants met full IDF MetS criteria



~1 in 8 urban Nepali adults in the high-risk cohort



> Community-based setting — reflects real-world burden



♂ Higher odds among female participants vs male



\* Consistent with rising South Asian MetS trend

# Results: MetS by Sex & Ethnic Group

## MetS Odds by Sex

**Key Finding: Females showed significantly HIGHER odds of MetS than males.**

Women in South Asia tend to have higher visceral adiposity relative to waist measurements — even at 'normal' BMI.

Hormonal factors (especially post-menopausal state) increase cardiometabolic risk in women.

Cultural norms in Nepal may reduce physical activity among women, increasing MetS risk. Women may be less likely to seek screening — leading to accumulation of unmanaged risk factors.

Sex-disaggregated NCD interventions are urgently needed in Nepal.

## MetS Odds by Ethnicity

**Key Finding: Underprivileged ethnic groups showed HIGHER odds of MetS.**

Nepal has significant ethnic and caste-based socioeconomic stratification.

Disadvantaged groups face limited access to nutritious food, clean water, and health services.

Lower health literacy and reduced ability to afford medications may compound risk.

Cultural dietary practices in some communities (high carb, high fat) raise metabolic risk.

Ethnicity-specific interventions and culturally sensitive screening programs are essential.

# Results: Age & Smoking — Multivariable Findings

## 🕒 Age ≥50 Years — Protective Effect

**Age ≥50 inversely associated with MetS  
(protective — lower odds of MetS)**

- Counter-intuitive finding — typically MetS prevalence rises with age in many populations.
- Possible survivor bias: those with severe MetS at younger ages may not have survived to older age cohort.
- Older participants in this sample may have more NCD management and treatment (controlling components).
- High-risk younger adults (40–49) may represent a more vulnerable, unscreened group.
- Highlights the need for early screening and intervention before age 50.

## 🚭 Smoking — Higher MetS Odds

**Smokers showed significantly HIGHER odds of MetS after adjustment**

- Smoking prevalence: 52.1% — the second most prevalent risk factor in the cohort.
- Tobacco smoke induces insulin resistance, dyslipidemia, and oxidative stress — core MetS drivers.
- Nicotine promotes visceral fat accumulation, particularly central obesity.
- Smokers in this study were more likely to have co-occurring hyperglycemia and hypertension.
- Smoking cessation programs are a high-impact, cost-effective MetS prevention strategy in Nepal.

# Results: Summary of Multivariable Findings

Risk Factor	Direction of Effect	Significance	Clinical Implication
Female Sex	↑ Higher Odds	Significant	Sex-specific prevention needed
Smoking (Current)	↑ Higher Odds	Significant	Cessation programs critical
Underprivileged Ethnicity	↑ Higher Odds	Significant	Culturally tailored programs
Age ≥50 Years	↓ Lower Odds	Significant (Protective)	Screen high-risk younger adults
Employment Status	— No Difference	Not Significant	No independent association
Formal Education Level	— No Difference	Not Significant	No independent association

**Key Insight: Sex, ethnicity, and smoking status — not education or employment — are the primary modifiable MetS determinants in this population.**

# Conclusion & Takeaway Messages

**13.1% of urban high-risk Nepali adults met full MetS criteria — approximately 1 in 8.**

## Smoking Cessation

Smoking (52.1%) is a major, modifiable MetS driver. Targeted cessation programs must be a priority within NCD management in Nepal.

## \* Culturally Tailored Programs

Underprivileged ethnic groups face disproportionate MetS risk. Interventions must be culturally adapted and community-rooted.

## Sex-Specific Prevention

Women showed higher MetS odds. Sex-disaggregated screening and lifestyle programs are urgently needed across Nepal.

## Early & Targeted Screening

Adults under 50 in high-risk groups need early multicomponent screening to detect and manage MetS components before full syndrome develops.

# Acknowledgment & References

## Acknowledgments

### Study Participants

1,458 individuals from Pokhara Metropolitan City

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Data collection across 23 wards

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### Ministry of Health, Gandaki

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### International Partners

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## Key References

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# About the Presenter



## Dr. Sweta Koirala

*Medical Doctor | PhD, Nagasaki University, Japan*

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- Medical doctor with many years of clinical practice, and a PhD from Nagasaki University, Japan — bridging frontline care with rigorous research.
- Passionate about community health: studying key determinants of health problems and materializing programs to address them.
- Believes that aware and educated youth can drive positive change — cultural, medical, and ecological.

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