AGE-SEX DISTRIBUTION AND PREDICTORS OF OVERWEIGHT/OBESITY AMONG SCHOOL-AGED CHILDREN: A GLOBAL PERSPECTIVE WITH FOCUS ON NEPAL

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I. BACKGROUND & OBJECTIVES

Background

Childhood overweight/obesity increasing globally

Affecting 493 million young people in 2021, obesity rates have doubled in all youth age groups since 1990



Older adolescents (15 to 24 years)

Inge et.al., *Pediatrics*, DOI: https://doi.org/10.1542/peds.2013-2185 GBD 2021 Adolescent BMI Collaborators, *The Lancet, https://doi.org/10.1016/S0140-6736(25)00397-6* Overweight/obes ity is a major contributor to noncommunicable diseases (NCDs)

Limited availability of comparative data from low-andmiddle income countries like Nepal





Objectives

- Examine distribution of overweight/obesity across 102 countries and territories
- Estimate prevalence of obesity and behavioral risk factors by age and sex with a focus on Nepal
- Assess associations between behavioral risk factors (diet, physical activity) and overweight/obesity

II. Methods

Data source and Sample

Data Sources

- Health Behavior in School-aged Children (HBSC) study: Europe and Canada (47 countries)
- Global School-based Student Health Survey (GSHS): Other regions (55 countries)

Data collection method

• Self administered questionnaire filled by school students

Sample

- Overall sample: students aged 12–15 years (*n*=324,433)
- Nepal sample: 4,616 students from 2015 survey

Variables

Outcome variable

• Overweight/obesity: BMI-for-age > 1 SD above median

Independent Variables

- Low fruit/vegetable Intake: Consuming fruits or vegetables < 1 time/day
- Low physical activity: Physically active (>60 min/day) for < 5 days/week

Covariates

Individual-level

- Current alcohol intake: Consumed alcohol ≥1 time in the last 30 days
- Current smoking: Smoked ≥1 time in the last 30 days

Country-level

- Human Development Index (HDI)
- Gender Development Index (GDI)

Statistical analysis

Descriptive Analysis

- Estimated prevalence with 95% CIs
- Accounted for survey design; strata unavailable in HSBC, thus omitted

Handling Missing Data

- Multiple imputation (20 datasets) via *mice* package in R
- Two-level imputation within each country

Regression Analysis

- Mixed-effects logistic regression using glmer from Ime4 package in R
- Accounted for country-level clustering; country-level random intercept
- HDI and GDI standardized (z-scores), modeled using restricted cubic splines

Part III Results

Characteristics of participants

	Overall, N	Age,	Male <i>, n(%)</i>		
Overall	323,232	13.8 (1.0)	153,727 (47.5)		
Nepal	4,562	13.8 (1.0)	2,058 (45.1)		
Region					
Africa	20,347	14.0 (0.9)	8,761 (43.1)		
Asia	78,529	13.8 (1.0)	35,669 (45.4)		
Caribbean	15,531	13.8 (1.0)	7,133 (45.9)		
Central and North America	15,388	13.8 (1.1)	7,568 (49.2)		
Europe	140,484	13.8 (1.1)	69,345 (49.4)		
Oceania	9,635	13.9 (1.0)	4,421 (45.9)		
South America	43,318	14 (0.8)	20,830 (48.1)		

Prevalence and distribution of overweight/obesity



Overweight/Obesity prevalence in Nepal by age and sex



Country/ Territory	Prevalence of overweight/obesity (%)
Wallis and Futuna	63
Samoa	59.8
Cook Islands	59
Tonga	55.1
Chile	49.2
Kuwait	48.6
French Polynesia	47.5
Bahamas	44.2
Bahrain	42
Brunei	40.1

NEPAL 8.2 (7.9 - 8.5)

Liberia	0.3
Tanzania	2.2
Saint Lucia	2.8
Ireland	3.8
Cambodia	4.1
Eswatini	5.3
Wales	6.3
Vietnam	6.4
Scotland	6.5
Sri Lanka	7.1

Female Male

Prevalence of behavioral risk factors



Association between behavioral risk factors and overweight/obesity

	All participants			Males		Females			
Independent variables	AOR [95% CI]			AOR [95% CI]		AOR [95% CI]			
Low fruit and vegetable intake	1.09 [1.06, 1.11]		HEH	1.09 [1.06, 1.12]	HEH	1.06 [1.02, 1.09]		HeH	
Low physical activity	1.25 [1.23, 1.28]		HEH	1.31 [1.27, 1.35]	HEH	1.19 [1.15, 1.24]		HEH	
Low Physical activity + Low fruit and vegetable intake	1.25 [1.22, 1.28]		HEH	1.30 [1.27, 1.34]	HEH	1.19 [1.15, 1.23]		HEH	
Low Physical activity + Low fruit and vegetable intake + HDI*	1.25 [1.22, 1.28]		HEH	1.31 [1.27, 1.35]	HEH	1.20 [1.16, 1.25]		H	
Low Physical activity + Low fruit and vegetable intake + HDI+GDI*	1.26 [1.23, 1.29]		HEH	1.32 [1.28, 1.36]	H	1.20 [1.15, 1.24]			
		0.9 1 C	^{1.35} Odds ratio	0.	.9 1 1.35 Odds ratio		0.9	1 Odds ratio	

*Models adjusted for alcohol intake and current smoking.

Models for all participants were adjusted for age and sex with a random intercept of country; all models for males and females were adjusted for age with a random intercept of country.

- Individuals with both low physical activity and poor dietary habits showed 25% higher odds of overweight/obesity
- Adding socio-economic inequality measures (HDI and GDI) to the model did not reduce the risk

Part IV DISCUSSION AND CONCLUSION

Discussion

- In 2021, a GBD study showed that among 10- to 14-year-olds, the prevalence of overweight/obesity was higher than our study [10.7% in males and 11.5% in females in 2021], and it is projected to rise to 21.3% and 25.6%, respectively, by 2050
- The higher prevalence and odds among males warrants exploration of gendered sociocultural norms around food choices, physical activity opportunities, and body image
- Recall and social desirability biases, potentially attenuating or exaggerating true associations are possible

Conclusion

- Overweight/obesity prevalence varied significantly by countries/territories ranging from <1% to 63%
- Prevalence of overweight/obesity was 8.2% in Nepalese participants, with slightly higher value in males
- Behavioral risk factors, such as low fruit/vegetable intake (25%) and insufficient physical activity (77%), were highly prevalent, especially among male adolescents
- Low physical activity and poor dietary intake were significantly associated with 25% higher odds of overweight/obesity

TAKE HOME MESSAGE

Adolescent obesity is rising in Nepal and globally, likely driven by poor diet and low physical activity.

Multilevel action and better national data are urgently needed to guide prevention.

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Biography



Suman Sapkota, MSc, is an early-career public health researcher with expertise in epidemiology, health statistics, and health research designs. As a Research Associate at the Nepal Health Economics Association, he supports national health priority setting, with research interests in nutrition, health equity, environmental epidemiology and survey analytics.

THANK YOU