Cardiovascular Risk Factors and COVID-19 Infection

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On behalf of the Prospective Urban Rural Epidemiology (PURE) Investigators

Background

- Few prospective data on individual-level risk factors for acquiring COVID-19

- While cardiovascular disease and risk factors associated with worse outcomes among those who contract COVID-19, there is limited information on whether they also increase the risk of contracting COVID-19

Objective

- To evaluate the relationship between cardiovascular risk factors/ disease and development of COVID-19 in community-dwelling adults

Methods – the PURE Study

- Ongoing prospective cohort study conducted in urban and rural communities in 26 high-, middle- and low-income countries

- Overall study: 200,000 community-dwelling adults aged 35-70 years at enrolment

- Mean follow-up 11 years

Methods – the PURE COVID-19 Substudy

- Questionnaire to PURE participants to collect data on clinically diagnosed COVID-19 - implemented as able under pandemic restrictions

- As of July 15, 2021: Data available from first 22,962 respondents from 20 countries

Results

- 972 (4.2%) reported having had COVID-19
- 94% cases confirmed by local laboratories

Incidence rates
- HIC: 4%
- UMIC: 7%
- LMIC: 5%
- LIC: 1%

Results – Participant Characteristics

Characteristic	No COVID-19 N=21,990	COVID-19 N=972	P-value
Age, years	62.6±9.8	59.0±9.7	<0.0001
Female sex	61%	60%	0.66
Tobacco			<0.0001
Former	16%	19%	
Current	18%	12%	
Never	66%	69%	
Physical activity (by IPAQ)			0.75
Low	14%	14%	
Medium	33%	34%	
High	53%	52%	
Diabetes	14%	15%	0.30
Prior CVD (MI, stroke or HF)	7%	9%	0.039

Results – Participant Physical & Lab Measurements

Characteristic	No COVID-19 N=21,990	COVID-19 N=972	P-value
Body-mass index, kg/m^2	26.0±6.6	28.5±5.2	<0.0001
Waist circumference, cm			
Women	82.7±15.1	88.7±12.6	<0.0001
Men	88.8±14.5	95.5±12.2	<0.0001
Waist-hip ratio			
Women	0.83±0.08	0.86±0.07	<0.0001
Men	0.92±0.08	0.94±0.07	<0.0001
Systolic blood pressure, mmHg	128±21	128±21	0.89
Diastolic blood pressure, mmHg	80±13	82±17	<0.0001
Total cholesterol, mmol/L	4.98±1.4	5.10±1.0	0.036

Multivariable Model for Characteristics Associated with COVID-19

| Characteristic	Odds ratio	95% confidence interval	P-value
Age, per year increase	0.97	0.96-0.98	<0.0001
Male sex	0.95	0.79-1.16	0.63
Urban community	1.34	1.11-1.62	0.002
Low or low-middle income country	0.56	0.45-0.71	<0.0001

Education
  Primary
  Secondary
  > Secondary
	
	1
	1.02
	1.16
		
		0.82-1.27
		0.93-1.44
			
			0.87
			0.18

Never smoker Current/ former smoker	1 0.94	 0.79-1.12	0.49
Cardiovascular disease	1.24	0.93-1.65	0.14
Diastolic blood pressure, per 10mmHg increase	1.06	0.98-1.14	0.13

Body-mass index, kg/m^2
  <20
  20 to <30
  ≥30
	
	0.55
	1
	0.83
		
		0.33-0.93
		
		0.65-1.06
			
			0.027
			
			0.14

Waist circumference, per 5cm increase	1.13	1.07-1.19	<0.0001
Serum total cholesterol, per mmol/L increase	0.97	0.90-1.06	0.34

Risk of COVID-19 compared with waist circumference 75cm
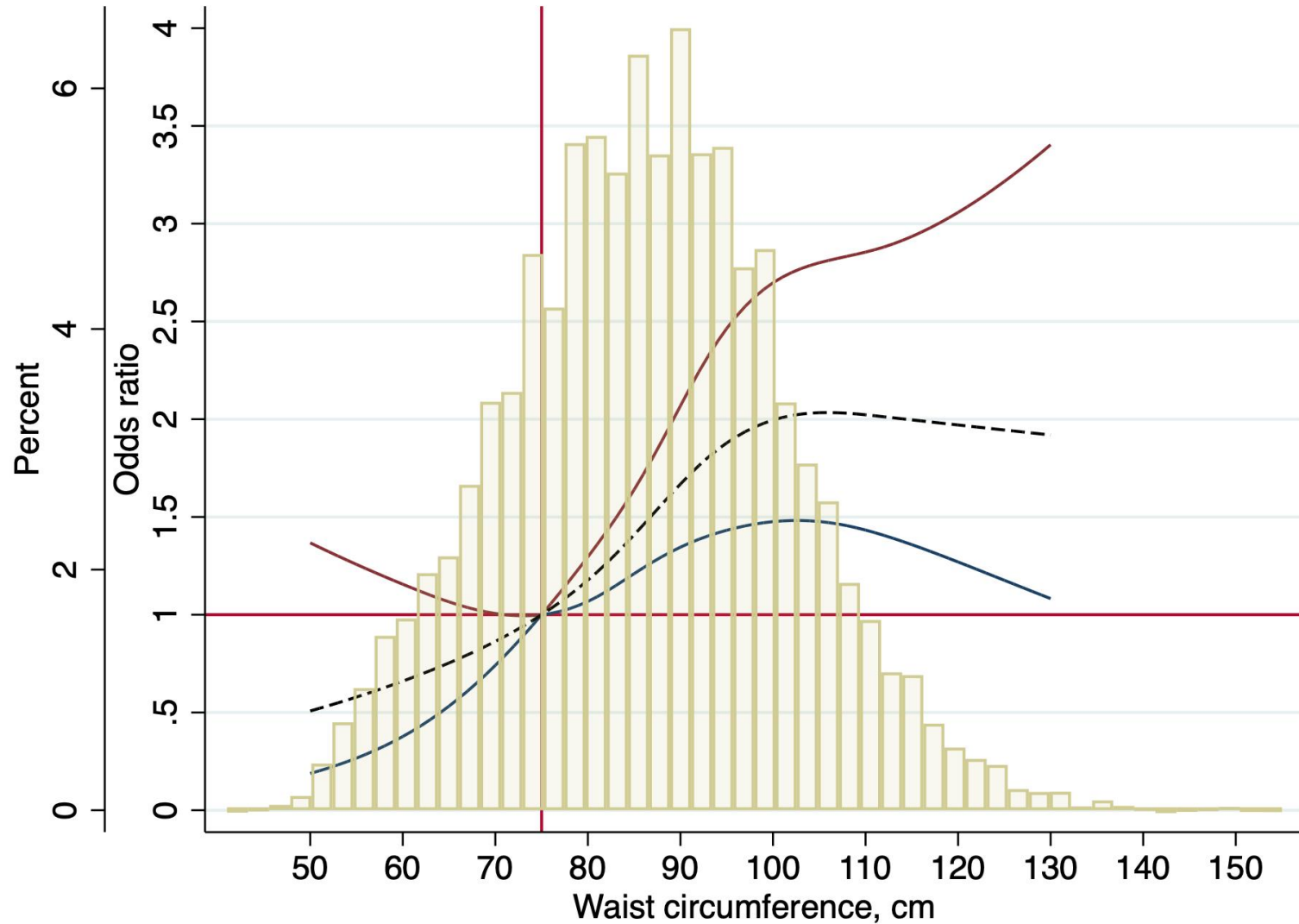
Adjusted for
- Age
- Sex
- Country income level
- Urban vs. rural community
- Education
- Tobacco use
- Past cardiovascular disease
- Body-mass index
- Serum cholesterol
- Diastolic blood pressure

Adjusted risk of COVID-19 compared with waist circumference 75cm – HIC/UMIC vs. LMIC/LIC
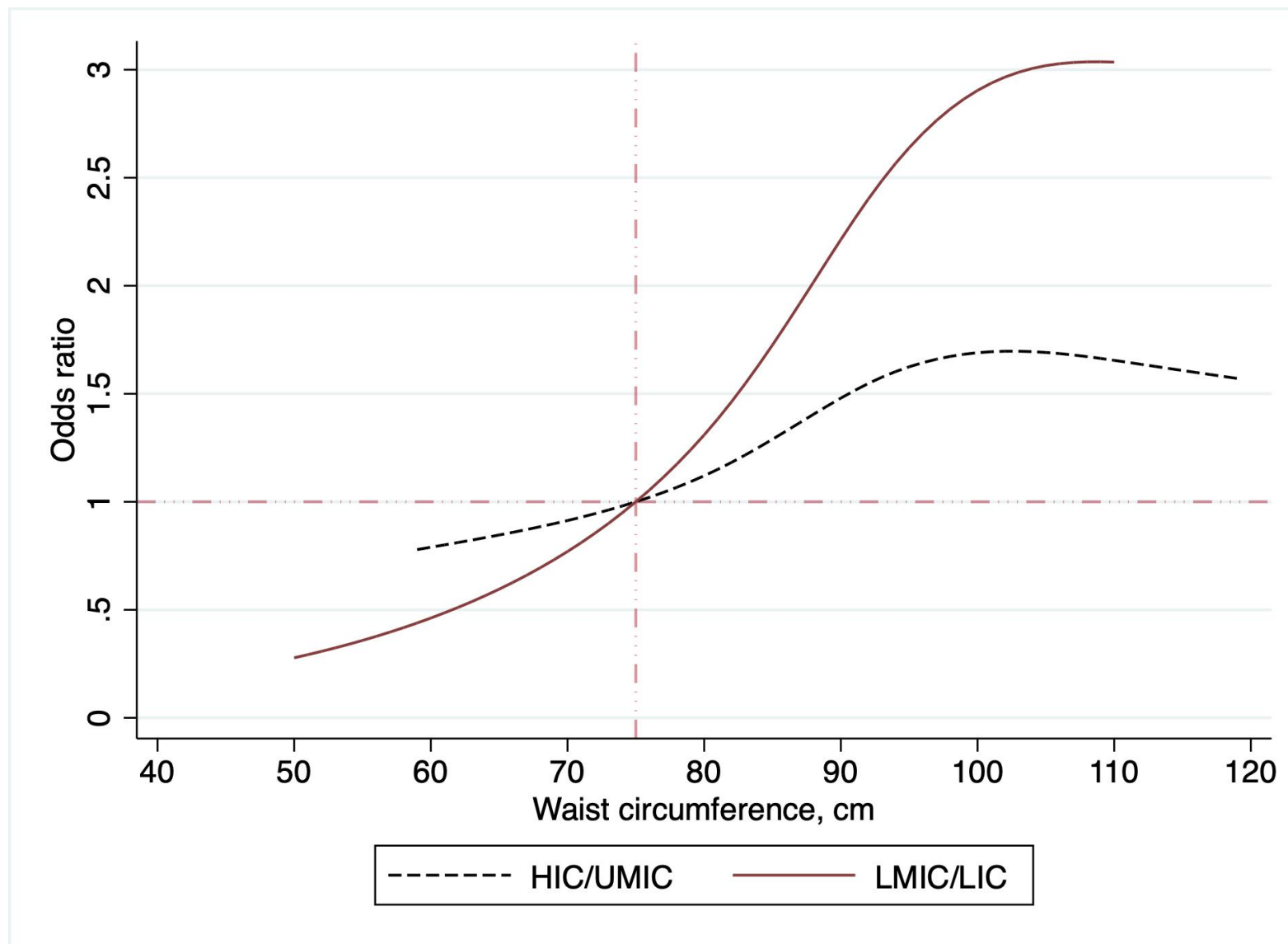
Conclusions

- Cardiovascular risk factors more frequent among those affected by COVID-19
  - Previous smoking
  - Higher body-mass index & higher waist circumference
  - Previous cardiovascular disease
  - Higher diastolic blood pressure
  - Higher serum cholesterol
- Higher waist circumference is associated with COVID-19 independently of other characteristics

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