Birth size and early growth indicators of adult cardiac size and function among Asian Indians: A population-based birth cohort study

Dr Mahasampath Gowri S

Lecturer, Department of Biostatistics,

Christian Medical College, Vellore, Tamil Nadu,

India- 632002

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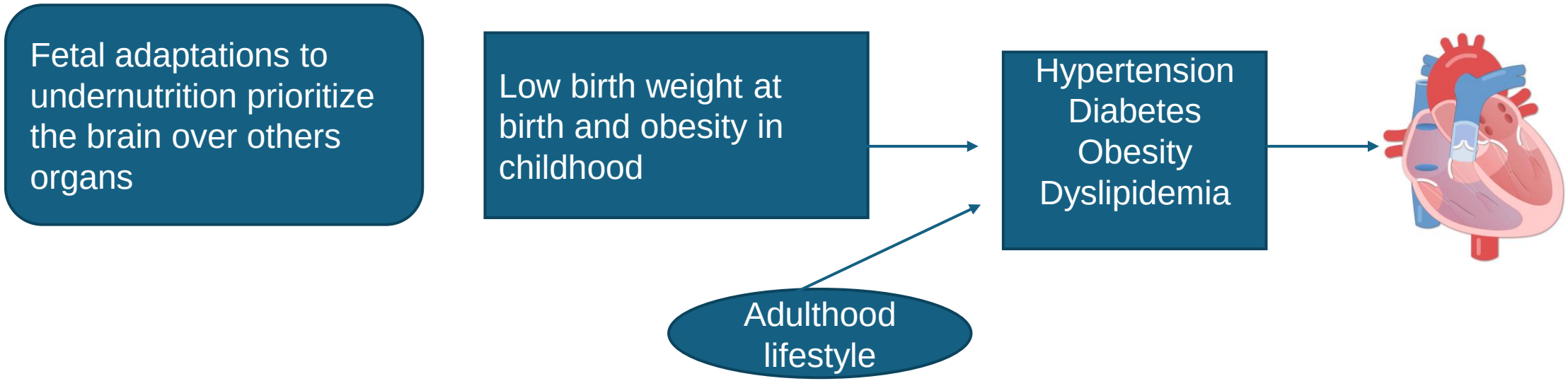
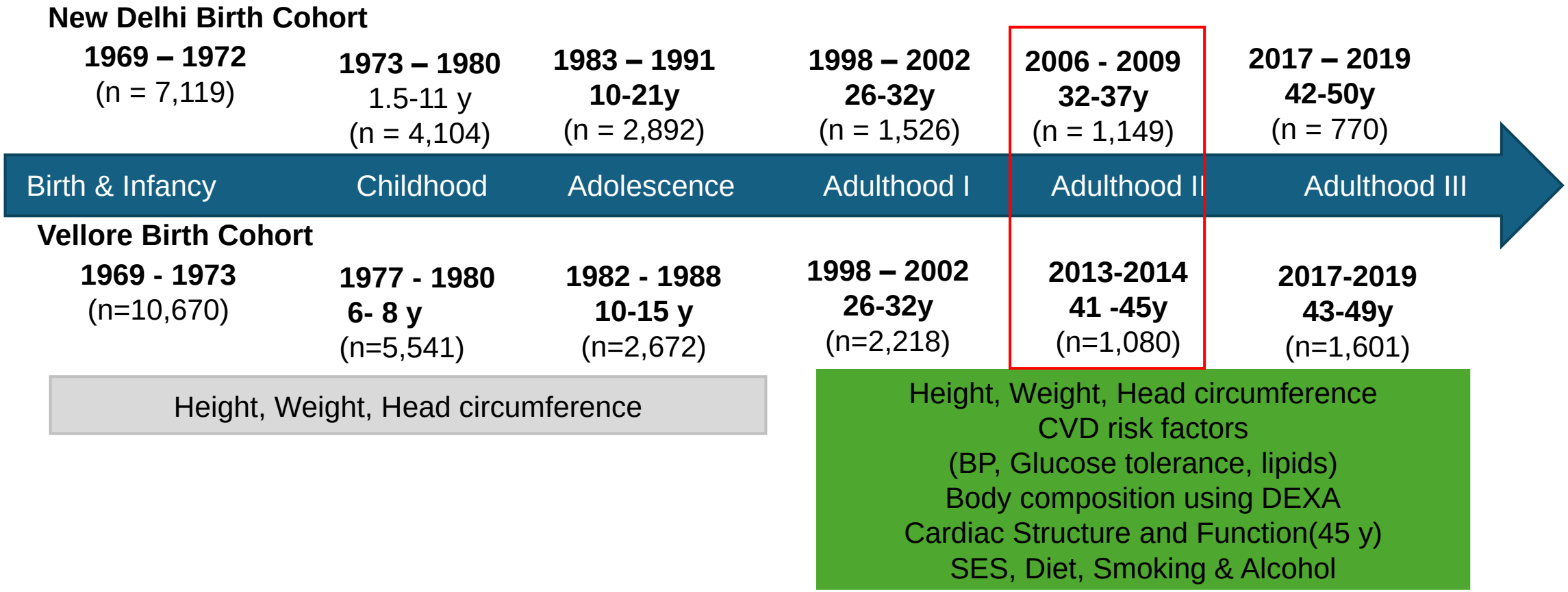
Background

- South Asians – Increased risk for cardiovascular disease
- Relationship between birth size and early growth on adult cardiac structure and function in Asian Indians – poorly understood



Vasan et al., IndEcho Study., BMJ Open. 2018.

Study population



Cardiac function measured using Transthoracic echocardiography on a Philips CX50 Compact Xtreme system equipped with an IPx-7, S5-1 (Cardiac Sector Probe) transducer.

Vasan SK et al., Echocardiography Protocol. Front Cardiovasc Med. 2023

Statistical methods

Predictors:

- Growth measures of 0-15y were converted into sex-specific Z-scores using the WHO growth reference.
- Adult measurements were converted into cohort- and sex-specific Z-scores.
- Missing data for infancy (10%), childhood (7.2%) and adolescence (14.1%) were imputed from birth and adulthood growth using Multiple Imputations by Chained Equations (MICE)
- To disentangle the impacts of growth in height and weight gain across different developmental stages, we employed "conditional" size measures, which are standardized residuals derived from regressing current size on prior size

Outcomes

- Cardiac structure and function parameters were converted into sex-specific Z-scores

Analysis

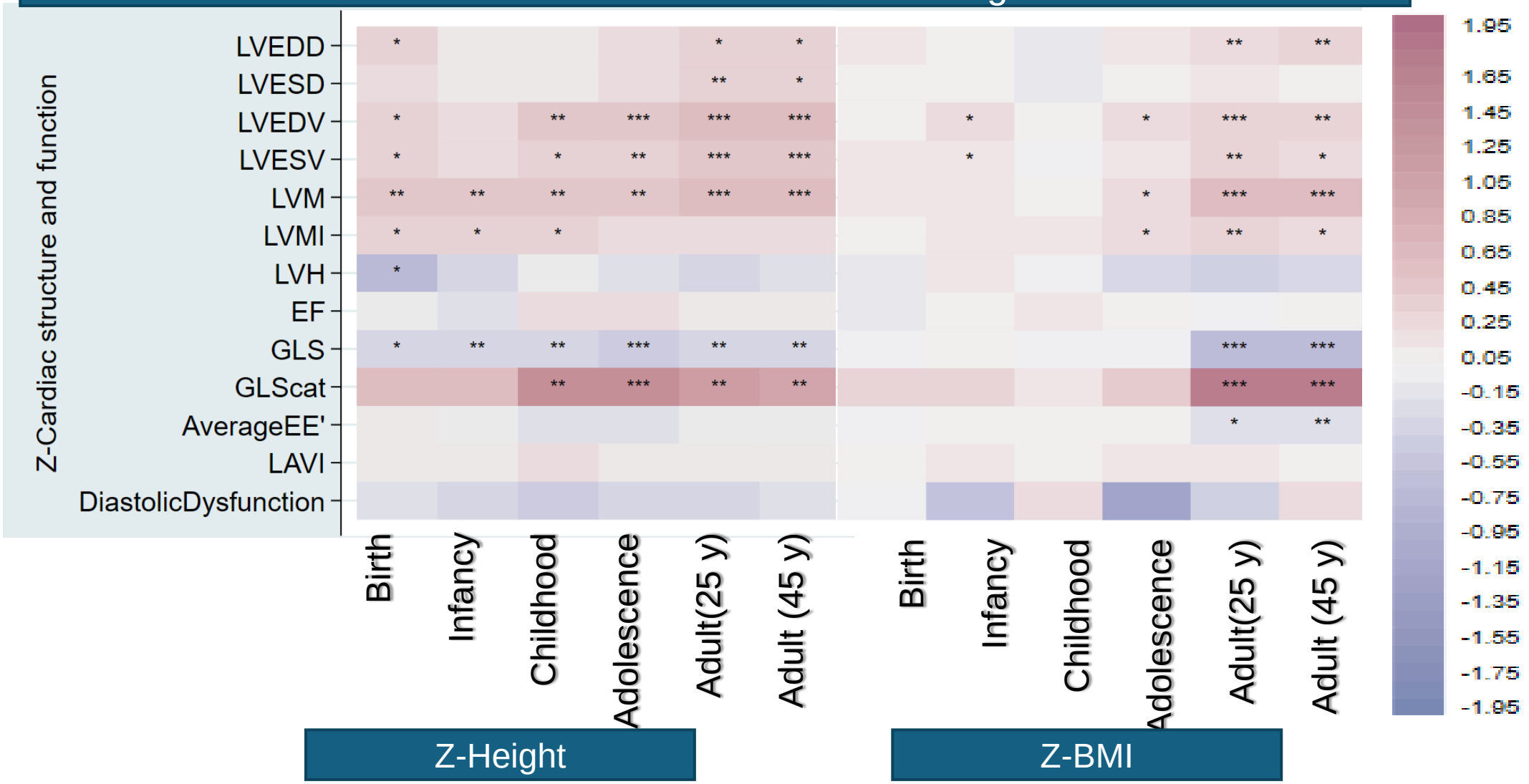
- Linear regression and Logistic regression based on outcome type were used

Results

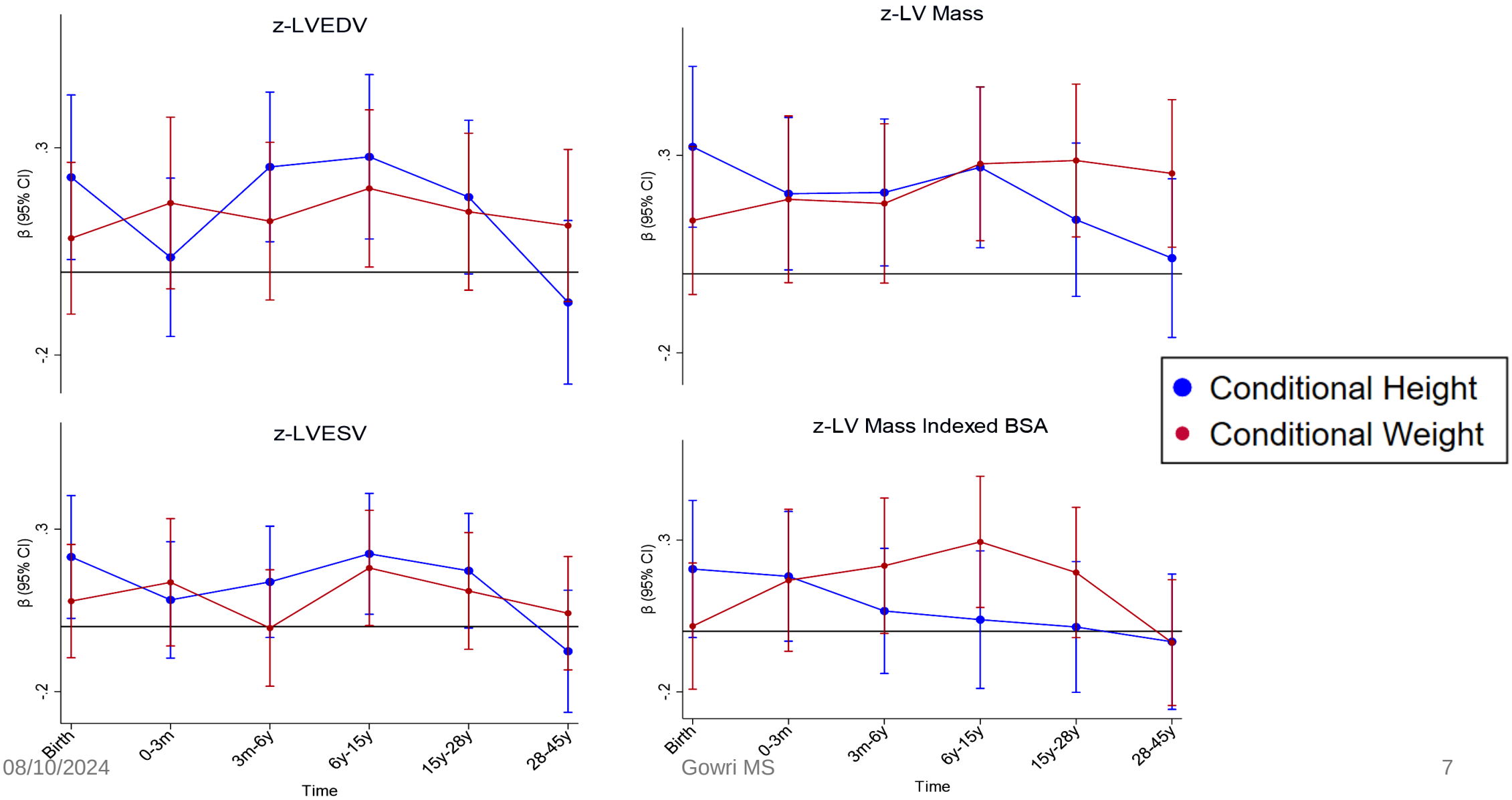
Variable units	Delhi		Vellore	
	Male (n=456)	Female (n=289)	Male (n=824)	Female (n=745)
BMI (kg/m²)	27.7 (4.7)	29.4 (5.1)	24.4 (4.2)	26.1 (5.1)
SLI score	41.6 (5.1)	41.0 (5.6)	29.5 (6.6)	28.8 (6.7)
Tobacco use	123 (27.1)	3 (1.0)	256 (31.1)	42 (5.6)
Alcohol consumption	254 (56.1)	12 (4.1)	390 (47.8)	0 (0.0)
Diabetes	187 (40.7)	104 (35.5)	212 (25.7)	158 (21.2)
Hypertension	204 (44.4)	79 (27.0)	268 (32.5)	173 (23.2)
Obesity (BMI ≥30 kg/m²)	126 (27.6)	124 (42.9)	77 (9.3)	168 (22.5)
Cardiac Size and Function				
LV mass indexed for BSA (g/m²)†	68.0 (58.8,79.4)	63.9 (56.4, 75.3)	65.8 (57.7, 75.9)	61.6 (54.6, 70.3)
Concentric remodelling/hypertrophy	73 (22.1)	44 (21.0)	239 (29.0)	257 (34.5)
Eccentric hypertrophy	13 (3.9)	17 (8.5)	12 (1.5)	17 (2.3)
LV ejection fraction	64.5 (61.6, 67.3)	64.9 (61.7, 67.2)	65.4 (63.2, 67.3)	65.7 (63.6, 67.5)
Global Longitudinal Strain(%)	-18.0 (3.4)	-18.3 (2.7)	-19.1 (2.2)	-19.7 (2.2)
Borderline/Abnormal GLS	94 (20.8)	51 (17.6)	117 (14.2)	72 (9.7)
Mitral E/average e'	7.4 (6.5, 8.4)	7.8 (6.8, 9.2)	7.9 (6.9, 9.2)	8.6 (7.4, 9.7)

Association of growth and outcomes

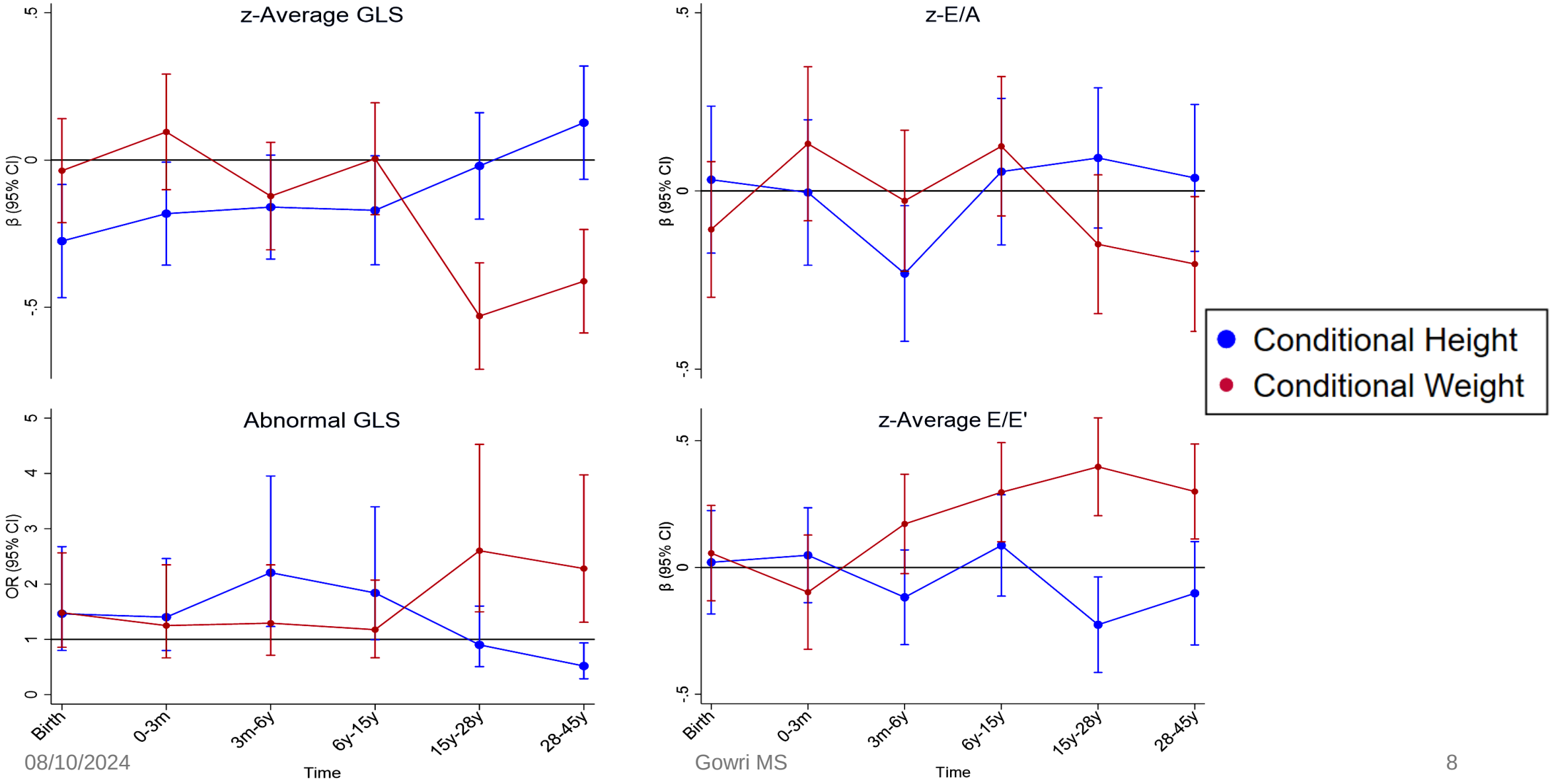
Matrix of beta coefficients of outcomes associated with growth at each window



Conditional growth and Cardiac size



Conditional growth and Cardiac function



Conclusions

- Adult height and BMI are independently associated with the outcomes
- Shorter birth lengths were associated with RWT and GLS suggesting myocardial impairment with shorter height, and associations were insignificant when adjusted for current BMI and height
- There was no evidence that early life weight as a factor
- Further analysis is needed to understand the mediating effect of cardiovascular risk factors in the association of early growth and cardiac size

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Email: gowri.cmc@gmail.com