

LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



Kinra, S; Andersen, E; Ben-Shlomo, Y; Bowen, L; Lyngdoh, T; Prabhakaran, D; Reddy, KS; Ramakrishnan, L; Bharathi, A; Vaz, M; Kurpad, A; Smith, GD; Ebrahim, S; Indian Migration Study Group, (2011) Association Between Urban Life-Years and Cardiometabolic Risk: The Indian Migration Study. *American journal of epidemiology*, 174 (2). pp. 154-64. ISSN 0002-9262 DOI: <https://doi.org/10.1093/aje/kwr053>

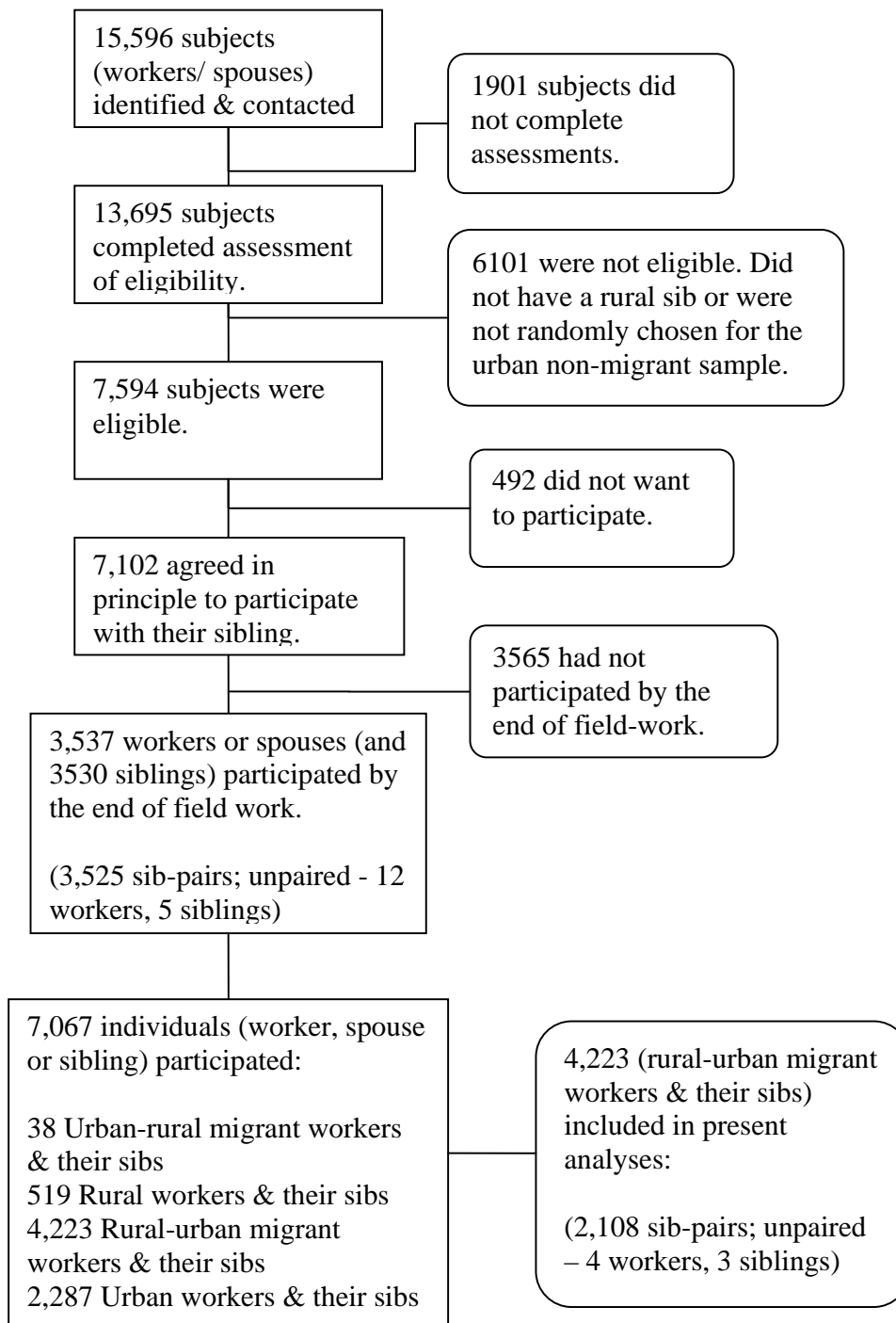
Downloaded from: <http://researchonline.lshtm.ac.uk/691/>

DOI: [10.1093/aje/kwr053](https://doi.org/10.1093/aje/kwr053)

Usage Guidelines

Please refer to usage guidelines at <http://researchonline.lshtm.ac.uk/policies.html> or alternatively contact researchonline@lshtm.ac.uk.

Available under license: <http://creativecommons.org/licenses/by-nc-nd/2.5/>



Web Figure 1: Recruitment flow chart for the Indian Migration Study 2005-2007.

Web Table 1: **Subject (factory worker or spouse) characteristics by responder status**

Characteristics	Responders	Non-responders	No consent
N	3537	3565	492
Male, N (%)	1,800 (50.9)	2,057 (57.7)	279 (56.7)
Age, mean (SD)	41.7 (9.2)	41.9 (9.6)	46.2 (7.9)
Hindu religion, N (%)	3,243 (91.7)	3,345 (93.8)	446 (90.7)
Married, N (%)	3,436 (97.1)	3,439 (96.5)	478 (97.1)
Self reported high blood pressure, heart disease or stroke, N (%)	684 (19.3)	526 (14.8)	104 (21.1)
Currently smoke/chew tobacco, N (%)	646 (18.3)	723 (20.3)	80 (16.3)
Distance in hours from factory to place of origin, Mean (SD) (Q1; Q3)	6.5 (7.0) (2; 9)	6.8 (8.0) (1; 9)	8.2 (9.6) (2; 12)
Migrant, N (%)	2,112 (59.7)	2,165 (60.7)	372 (75.6)

Web table 2: Levels of cardio-metabolic risk factors by percentage of life spent in an urban area

Outcome variable	Adjusted Mean in Groups of Percent Urban Life	
	Men	Women
% Body Fat (%)*** ###		
0 Urban life-years	21.72 [21.43, 22.01]	29.49 [29.00, 29.98]
0 < Urban Life ≤ 35%	24.26 [23.55, 24.98]	30.93 [30.19, 31.67]
35% < Urban Life ≤ 50%	24.90 [24.30, 25.51]	32.20 [31.48, 32.93]
50% < Urban Life ≤ 62.5%	25.63 [25.09, 26.16]	31.96 [31.35, 32.56]
More than 62.5% urban life	25.67 [25.12, 26.22]	32.46 [31.68, 33.25]
Systolic BP (mmHg)**		
0 Urban life-years	123.14 [122.24, 124.05]	120.14 [118.69, 121.59]
0 < Urban Life ≤ 35%	124.76 [122.52, 126.99]	119.18 [116.94, 121.42]
35% < Urban Life ≤ 50%	124.44 [122.55, 126.33]	119.28 [117.11, 121.45]
50% < Urban Life ≤ 62.5%	124.36 [122.69, 126.02]	119.57 [117.76, 121.38]
More than 62.5% urban life	126.32 [124.62, 128.01]	119.16 [116.82, 121.50]
Diastolic BP (mmHg)***		
0 Urban life-years	77.09 [76.48, 77.69]	76.90 [76.00, 77.79]
0 < Urban Life ≤ 35%	78.73 [77.23, 80.23]	77.42 [76.04, 78.79]
35% < Urban Life ≤ 50%	78.72 [77.45, 79.99]	77.01 [75.67, 78.35]
50% < Urban Life ≤ 62.5%	78.98 [77.86, 80.09]	76.77 [75.65, 77.88]
More than 62.5% urban life	79.84 [78.70, 80.98]	77.54 [76.10, 78.98]
Body mass index (kg/m²)*** ###		
0 Urban life-years	22.03 [21.85, 22.22]	22.98 [22.61, 23.34]
0 < Urban Life ≤ 35%	22.98 [22.52, 23.44]	23.70 [23.14, 24.27]
35% < Urban Life ≤ 50%	23.42 [23.04, 23.81]	25.11 [24.57, 25.66]
50% < Urban Life ≤ 62.5%	23.73 [23.39, 24.07]	25.32 [24.86, 25.78]
More than 62.5% urban life	23.96 [23.61, 24.31]	25.39 [24.79, 25.98]
Waist circumference (cm) *** ###		
0 Urban life-years	81.77 [81.25, 82.29]	76.19 [75.32, 77.07]
0 < Urban Life ≤ 35%	84.51 [83.22, 85.80]	78.59 [77.23, 79.94]
35% < Urban Life ≤ 50%	85.21 [84.12, 86.31]	80.06 [78.74, 81.37]
50% < Urban Life ≤ 62.5%	87.19 [86.23, 88.15]	80.23 [79.14, 81.32]
More than 62.5% urban life	87.15 [86.17, 88.13]	80.92 [79.51, 82.33]
Total cholesterol (mmol/L) *		
0 Urban life-years	4.58 [4.52, 4.65]	4.77 [4.67, 4.87]
0 < Urban Life ≤ 35%	4.59 [4.43, 4.74]	4.81 [4.65, 4.96]
35% < Urban Life ≤ 50%	4.73 [4.60, 4.87]	4.74 [4.59, 4.90]
50% < Urban Life ≤ 62.5%	4.77 [4.65, 4.89]	4.79 [4.66, 4.92]
More than 62.5% urban life	4.66 [4.54, 4.78]	4.77 [4.60, 4.94]

Notes: Adjusted means in groups of percent urban life for men and women. All models include a random effect of sib-pairs. **Non-migrants are in zero urban life years group.** The **models are adjusted for age group, factory and socio-economic group.** * ~ p<0.05, ** ~ p<0.01, *** ~ p<0.001 for the test for trend in percent urban life in men and # ~ p<0.05, ## ~ p<0.01, ### ~ p<0.001 for the test for trend in percent urban life in women. ^{a)} Geometric mean.

Web table 2 (contd.): **Levels of cardio-metabolic risk factors by percentage of life spent in an urban area**

Outcome variable	Adjusted Mean in Groups of Percent Urban Life	
	Men	Women
LDL-cholesterol (mmol/L) *		
0 Urban life-years	2.78 [2.72, 2.83]	2.92 [2.82, 3.01]
0 < Urban Life ≤ 35%	2.79 [2.65, 2.93]	2.97 [2.83, 3.11]
35% < Urban Life ≤ 50%	2.91 [2.80, 3.03]	2.90 [2.76, 3.04]
50% < Urban Life ≤ 62.5%	2.89 [2.78, 2.99]	2.97 [2.85, 3.08]
More than 62.5% urban life	2.86 [2.76, 2.96]	2.98 [2.83, 3.13]
HDL-cholesterol (mmol/L)		
0 Urban life-years	1.14 [1.13, 1.16]	1.20 [1.18, 1.23]
0 < Urban Life ≤ 35%	1.14 [1.10, 1.17]	1.19 [1.16, 1.22]
35% < Urban Life ≤ 50%	1.17 [1.14, 1.20]	1.21 [1.18, 1.25]
50% < Urban Life ≤ 62.5%	1.15 [1.13, 1.18]	1.19 [1.16, 1.22]
More than 62.5% urban life	1.14 [1.11, 1.16]	1.17 [1.13, 1.20]
Triglycerides (mmol/L) *^a		
0 Urban life-years	1.31 [1.27, 1.34]	1.29 [1.24, 1.34]
0 < Urban Life ≤ 35%	1.34 [1.26, 1.43]	1.28 [1.20, 1.36]
35% < Urban Life ≤ 50%	1.32 [1.26, 1.40]	1.26 [1.19, 1.34]
50% < Urban Life ≤ 62.5%	1.43 [1.36, 1.49]	1.26 [1.20, 1.32]
More than 62.5% urban life	1.34 [1.27, 1.40]	1.23 [1.15, 1.31]
HOMA score ***^a		
0 Urban life-years	1.01 [0.96, 1.07]	1.14 [1.05, 1.23]
0 < Urban Life ≤ 35%	1.13 [1.00, 1.28]	1.13 [1.01, 1.28]
35% < Urban Life ≤ 50%	1.01 [0.90, 1.12]	1.31 [1.17, 1.48]
50% < Urban Life ≤ 62.5%	1.27 [1.15, 1.39]	1.28 [1.16, 1.42]
More than 62.5% urban life	1.32 [1.20, 1.46]	1.20 [1.05, 1.36]
Fasting glucose (<7) (mmol/L) ** ^a		
0 Urban life-years	4.98 [4.95, 5.02]	4.95 [4.90, 5.00]
0 < Urban Life ≤ 35%	4.98 [4.90, 5.07]	4.95 [4.88, 5.03]
35% < Urban Life ≤ 50%	4.99 [4.91, 5.06]	5.07 [4.99, 5.15]
50% < Urban Life ≤ 62.5%	5.10 [5.03, 5.17]	4.99 [4.93, 5.06]
More than 62.5% urban life	5.07 [5.00, 5.14]	4.93 [4.85, 5.01]
Fasting insulin (mU/L) ***^a		
0 Urban life-years	4.66 [4.43, 4.89]	5.24 [4.86, 5.65]
0 < Urban Life ≤ 35%	5.14 [4.56, 5.79]	5.21 [4.63, 5.85]
35% < Urban Life ≤ 50%	4.59 [4.15, 5.08]	5.99 [5.34, 6.71]
50% < Urban Life ≤ 62.5%	5.66 [5.18, 6.19]	5.90 [5.37, 6.49]
More than 62.5% urban life	6.00 [5.49, 6.57]	5.60 [4.96, 6.33]

Notes: Adjusted means in groups of percent urban life for men and women. **Non-migrants are in zero urban life years group.** All models include a random effect of sib-pairs. The **models are adjusted for age group, factory and socio-economic group.** * ~ $p < 0.05$, ** ~ $p < 0.01$, *** ~ $p < 0.001$ for the test for trend in percent urban life in men and # ~ $p < 0.05$, ## ~ $p < 0.01$, ### ~ $p < 0.001$ for the test for trend in percent urban life in women.
^a) Geometric mean.

Web table 3: **Effect modification of the association between urban life years and % body fat, systolic blood pressure (SBP) and fasting insulin by selected participant characteristics: Men**

Effect modifier	% Body fat. Effect of urban life- years first 10 years, per 10 years. (95% CI)	% Body fat. Effect of urban life- years after 10 years, per 10 years. (95% CI)	SBP Effect of urban life- years per 10 years (95% CI)	Insulin Effect of urban life- years per 10 years (95% CI)
Age 45				
Age < 45	2.89 [0.69, 5.09]	0.62 [-0.14, 1.37]	1.37 [-0.55, 3.29]	0.88 [0.63, 1.23]
Age ≥ 45	0.09 [-3.96, 4.13]	-0.02 [-0.48, 0.44]	1.44 [0.07, 2.81]	0.84 [0.57, 1.23]
Marital status				
Not married	-0.12 [-5.77, 5.54]	-0.06 [-1.35, 1.24]	1.03 [-2.45, 4.51]	1.12 [0.93, 1.35]
Currently married	2.90 [0.93, 4.88]	0.12 [-0.27, 0.52]	1.45 [0.30, 2.61]	1.07 [1.01, 1.14]
Household type				
Nuclear family or single	2.33 [-0.01, 4.67]	0.16 [-0.26, 0.58]	1.35 [0.10, 2.61]	1.08 [1.01, 1.15]
Extended family	3.40 [0.29, 6.50]	-0.11 [-0.73, 0.51]	1.57 [-0.09, 3.23]	1.06 [0.97, 1.15]
Socio-economic position				
			**	
Low/ Middle	12.17 [6.10, 18.25]	-0.50 [-1.54, 0.53]	2.21 [-0.96, 5.38]	1.01 [0.86, 1.20]
High	1.36 [-0.57, 3.30]	0.14 [-0.25, 0.54]	1.37 [0.21, 2.53]	1.08 [1.01, 1.14]
Occupation				
Manual / Housework	3.52 [-0.60, 7.65]	-0.04 [-0.89, 0.82]	1.72 [-0.59, 4.02]	1.08 [0.96, 1.22]
Skilled manual	2.12 [-0.75, 4.98]	0.16 [-0.32, 0.64]	1.79 [0.33, 3.24]	1.09 [1.01, 1.18]
Non-manual	2.68 [-0.51, 5.86]	0.04 [-0.52, 0.61]	0.93 [-0.62, 2.48]	1.04 [0.96, 1.13]

* ~ $p < 0.05$, ** ~ $p < 0.01$, *** ~ $p < 0.001$ for the test of no effect modification

Web table 3 (contd.): **Effect modification of the association between urban life years and % body fat, systolic blood pressure (SBP) and fasting insulin by selected participant characteristics: Women**

Effect modifier	% Body fat. Effect of urban life-years first 10 years, per 10 years. (95% CI)	% Body fat. Effect of urban life-years after 10 years, per 10 years. (95% CI)	SBP Effect of urban life-years per 10 years (95% CI)	Insulin Effect of urban life-years first 10 years per 10 years (95% CI)	Insulin Effect of urban life-years after 10 years per 10 years (95% CI)
Age 45		(borderline)			
Age < 45	4.26 [2.05, 6.47]	0.22 [-0.69, 1.13]	0.12 [-2.10, 2.33]	1.28 [0.89, 1.84]	0.95 [0.82, 1.10]
Age ≥ 45	-2.70 [-8.08, 2.69]	0.51 [-0.30, 1.31]	1.41 [-0.63, 3.45]	2.05 [0.85, 4.90]	0.90 [0.78, 1.02]
Marital status				*	
Not married	4.41 [-1.79, 10.61]	-1.26 [-2.96, 0.43]	0.47 [-1.94, 2.87]	4.53 [1.72, 11.96]	0.85 [0.65, 1.11]
Currently married	3.45 [1.29, 5.61]	0.38 [-0.23, 0.99]	0.84 [-0.66, 2.35]	1.19 [0.84, 1.68]	0.93 [0.85, 1.03]
Household type			*		
Nuclear family or single	1.85 [-0.39, 4.08]	0.31 [-0.32, 0.94]	0.96 [-0.56, 2.48]	1.43 [0.98, 2.06]	0.92 [0.83, 1.02]
Extended family	7.61 [4.04, 11.17]	-0.40 [-1.36, 0.56]	0.32 [-1.39, 2.03]	1.21 [0.68, 2.17]	0.95 [0.82, 1.12]
Socio-economic position			*		
Low/ Middle	5.20 [-1.70, 12.09]	-2.94 [-5.55, -0.33]	-1.16 [-5.21, 2.89]	1.94 [0.65, 5.84]	1.03 [0.68, 1.56]
High	3.14 [1.01, 5.27]	0.25 [-0.34, 0.83]	0.81 [-0.69, 2.31]	1.27 [0.89, 1.80]	0.92 [0.84, 1.01]
Occupation					
Manual / Housework	3.71 [1.60, 5.81]	0.07 [-0.54, 0.68]	0.99 [-0.53, 2.51]	1.41 [1.00, 2.00]	0.93 [0.84, 1.02]
Skilled manual	0.45 [-10.68, 11.59]	1.86 [-0.32, 4.04]	-1.59 [-4.24, 1.05]	1.66 [0.27, 10.42]	1.10 [0.76, 1.58]
Non-manual	1.68 [-6.34, 9.70]	0.24 [-1.29, 1.77]	0.88 [-1.18, 2.94]	0.80 [0.23, 2.78]	0.92 [0.73, 1.16]

* ~ $p < 0.05$, ** ~ $p < 0.01$, *** ~ $p < 0.001$ for the test of no effect modification