Socio-economic predictors of stunting in preschool children – a population-based study from Johannesburg and Soweto

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Background. Stunting continues to be a child public health concern in many African countries, including South Africa. This study uses data from the Birth to Twenty study, held in Johannesburg, to investigate a range of household-level socio-economic and social support predictors of stunting in children aged less than 30 months.

Design. Logistical regression models were constructed using a conceptual framework to investigate the association between early life measures of socio-economic status and stunting (<–2 standard deviations from the WHO (2006) standard), using data collected in the Birth to Twenty study.

Results. Stunting prevalence was 18.0% (213/1 186). In unadjusted analyses, numerous socio-economic status exposures showed significant associations with stunting; however, in final multivariable models, decreased likelihood of stunting was seen in children born to mothers who were employed (adjusted odds ratio (AOR)=0.60, 95% confidence interval (CI) 0.40 - 0.88), those with fathers who had completed secondary school (AOR=0.59, 95% CI 0.40 - 0.85), and whose parents employed a domestic worker (AOR=0.40, 95% CI 0.19 - 0.83), while increased likelihood of stunting was seen in male children (AOR=1.40, 95% CI 1.03 - 1.91), and those born of low birth weight (AOR=2.56, 95% CI 1.54 - 4.26).

Conclusions. Stunting and child malnutrition remain policy priorities for the South African Department of Health, and this study suggests that policies that aim to increase parental education level and reduce unemployment or target additional support to families with low education or unemployed parents may reduce stunting in preschool-age children in this setting.

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Childhood stunting continues to be a public health issue in many African countries, with a prevalence in children aged <3 years ranging from 27.2% to 44.9%, based on recent data from sub-Saharan Africa from the Demographic and Health Surveys programme.[1] South African Department of Health figures report a prevalence of stunting in this age group at the lower end of this range (25.5%).[2]

The consequences of stunting in early life include increased susceptibility to infectious diseases, attenuated cognitive ability and increased behavioural problems in childhood,[3] reduced final height, and increased risk of child and adult obesity.[4] This wide range of effects is particularly relevant in a setting experiencing a combined burden of infectious and non-communicable lifestyle-related diseases, as is the case in South Africa.[5]

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Stunting is principally caused by inadequate or inappropriate nutrition and the impact of infectious disease, including untreated paediatric HIV infection.[6] Appropriate weaning and complementary feeding behaviours, nutritional interventions, and disease control and treatment programmes are strategies to prevent stunting. However, their effectiveness also depends on counteracting the environmental and socio-economic circumstances that allow infection and sub-optimal nutrition to persist.

Most studies of the socio-economic status (SES) predictors of stunting in African settings emphasise the importance of maternal education,[7] provision of household water and sanitation services,[8] and household wealth or income (estimated by ownership of consumer durables).[9] Few studies have investigated the impact of both social and economic aspects of SES on stunting within an African setting, and studies tend not to include a wide range of household SES measures.

The Birth to Twenty (Bt20) study was established in 1990, as a long-term (20 years) study of a representative population of infants born in all districts of Johannesburg and Soweto between April and June 1990.[10] Follow-up on this cohort (*N*= 3 273) is ongoing, and data on their growth, development, and a wide range of household SES and social support measures are available. Using data from the Bt20 study, this paper investigates associations between stunting and early-life household SES, social support, and demographic factors, in children aged <30 months.

Methods

Measures

Measures of household SES and social support in the Bt20 study were predominantly drawn from questionnaires administered to mothers at baseline (antenatally), with information on the family dwelling collected 6 months *post partum*. The measures included parental education and employment; household water, sanitation and electricity supply; ownership of consumer durables; type of cooking fuel used; health insurance; employment of a domestic worker; and characteristics of the family's dwelling (e.g. type of structure, number of rooms, separate kitchen, roofing materials). Social measures included marital status, support from a partner, membership of an organisation, network of people with whom to discuss problems or from whom to ask for help, and support during pregnancy (e.g. whether pregnancy was wanted, and is family ready for the pregnancy).

Birth weight, gestational age, gender, maternal age at delivery and ethnicity were obtained from birth records and hospital obstetric records. Height was assessed at 3 and 6 months and annually from 12 months onwards by Bt20 investigators trained in the techniques of standardised growth measurement, who visited participants at their homes. Height was measured once using a portable infantometer or Holtain stadiometer and recorded to the nearest 0.1 cm. Reliability was by test-retest evaluation and monitoring of quality control throughout the study. Stunting was defined as a height-for-age *z*-score of >2 standard deviations below the median, using the age and sex-specific international growth standards developed by the World Health Organization (WHO) in their Multicenter Growth Reference Study.[11]

Data from assessments at approximately 3, 6, 12 or 24 months of age were used to calculate the prevalence of stunting at any age in children <30 months at assessment. Where length or height was available for >1 assessment (8.3% of children had data from all 4 assessments), the latest was included, as such children were included only once in analyses. Prevalence as opposed to rates of stunting over time was used, as the majority (>60%) of children had assessments at only one time point, principally owing to difficulty in retaining contact with this mobile population at a time of substantial social transition in South Africa.[12]

Statistical analysis

All analyses were conducted in Stata 10.0 (Stata Corporation, College Station, Texas, USA). We used forward stepwise logistical regression to identify potential explanatory variables associated with stunting, and initially developed two regression models. The first identified demographic, or proximate, measures, and the second identified SES and social support measures associated with stunting. Variables included were identified from univariable analyses, where exposures showing a strength of association of $p \leq 0.10$ with stunting were selected. These variables were added to the model one at a time, with those showing the strongest association being added first. Those that did not significantly add to the stepwise model ($p > 0.05$) were not retained. We used backward stepwise regression to check the validity of the models.

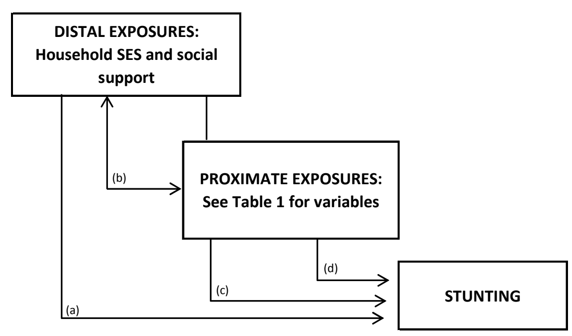
A final logistical regression model was built combining the first two, according to a conceptual framework (Fig. 1). This framework, adapted from Victora *et al.*,[13] enables groups of variables to be conceptualised as distal or proximate influences on stunting. Within this framework, effects of distal variables may be direct (Fig. 1a), confounded (Fig. 1b) or mediated through the effect of proximate variables (Fig. 1c). Likewise, the effect of proximate variables may also be confounded (Fig. 1b) or direct (Fig. 1d). The effect of distal variables in the final model was tested by comparing nested models, using likelihood regression tests.

Results

Sample characteristics

These analyses include 1 186 children for whom complete height or length, age and gender data were available, representing 36.2% of the Bt20 study; in comparison with the baseline cohort, more of the children included were born to black mothers ($p < 0.001$). However, no significant difference ($p > 0.05$) was seen for >15 other demographic and SES variables available for comparison when investigated, using chi-square tests to compare proportions and Kruskal-Wallis tests to compare medians (data not shown here).

The median age of the children was 23.2 months (interquartile range (IQR) 11.8 - 24.6 months), and similar proportions of boys and girls were seen; most (75.0%) were born to black mothers. In total, 9.2% of infants were premature (<37 weeks) and 7.7% were of low birth weight (LBW)



(Adapted from Victora[13])

(a) and (d): direct independent effects
(b): confounding effect
(c): effect of distal exposure mediated through proximate exposure

Fig. 1. Conceptual framework illustrating direct effects of distal exposures, confounded effects and effects mediated through more proximate exposures.

(<2 500 g). A total of 15.4% were born to mothers aged <20 years at delivery; the median age of the mothers was 25 years (IQR 21 - 30 years).

Most of the children were born into low SES households: 72% were born to mothers who had not completed secondary school, and 35% to mothers who were unemployed, while 35% were from homes with indoor hot water and 40.6% from homes with an indoor flush toilet. Although 60.1% of children's mothers were single (never married), almost half (47.5%) lived with partners; 58.0% of children's mothers reported during their pregnancy that they did not want the pregnancy or were unsure (although 72% felt that the family was ready for the arrival of a new child).

Stunting

A total of 213 children aged <3 years (18.0%, 95% confidence interval (CI) 15.8 - 20.1%) were defined as stunted; 52.3% had height data available from the 2-year assessment (*N*=621, age 22.5 - 29.0 months) and 24.5% were stunted (*N*=152). Of the remainder, 35.2% had data from the 1-year assessment (*N*=418, age 9.2 - 13.5 months), 7.7% of whom were stunted (N=32). Lastly, 12.4% had data available from the 6-month assessment (*N*=147, age 4.9 - 9.0 months), of whom 19.7% were stunted (*N*=29).

Table I shows results from both the univariable analysis and the first forward-fitted multivariable logistical regression model (*N*=1 182), illustrating the effects of demographic variables on stunting (Fig. 1). Male gender (AOR=1.41, 95% CI 1.04 - 1.90) and low birth weight (LBW) (AOR=2.25, 95% CI 1.32 - 3.83) showed increased likelihood of stunting. Decreased likelihood of stunting was seen in children born to mothers >20 years at delivery (AOR=0.68, 95% CI 0.46 - 1.00), and in children born to white (AOR=0.29, 95% CI 0.12 - 0.68), coloured (AOR=0.59, 95% CI 0.35 - 1.00) or Asian (AOR=0.32, 95% CI 0.13 - 0.78) mothers, in comparison with those born to black mothers.

In univariable analyses, higher levels of parental education, maternal employment, and monthly frequency of partner's pay were associated with reduced likelihood of stunting (Table II). Access to indoor hot water, an indoor flush toilet, electricity for cooking, ownership of a fridge or washing machine, employment of a domestic worker and private health insurance were also associated with reduced likelihood of stunting. Social measures also showed reduced likelihood of stunting in cases of a married mother, a mother who cohabited with a partner, a father who was resident in the home, and having been born to a mother who, when pregnant, reported that she felt her family was ready for the pregnancy (Table II).

Results from the second multivariable logistical regression model (*N*=1 178) indicated a reduced likelihood of stunting for children whose fathers had completed secondary school (AOR=0.64, 95% CI 0.43 - 0.95), whose mothers were employed (AOR=0.59, 95% CI 0.40 - 0.89), and whose parents employed a domestic worker (AOR=0.38, 95% CI 0.18 - 0.82) (Table II). The effects of the other economic SES variables significant in univariable analyses and the effect of social variables were attenuated and no longer significant, principally owing to colinearity with mother's employment (results not shown). Similarly, the effect of the frequency of father's pay and mother's schooling level was strongly attenuated owing to colinearity with father's schooling (results not shown).

SES and demographic predictors

Fig. 2 and Table III illustrate the combined effect of significant socio-economic (distal) variables and demographic (proximate) variables on stunting. Odds ratios (ORs) for stunting from this

Table I. Crude and adjusted measures of the effect of demographic (proximate) exposures on stunting in children aged <30 months

Proximate exposures	Category	Stunted 18.0% (213/1 186) % (stunted *N*/total)	Univariable analysis Crude OR (95% CI)	*p*-value	Forward-fitting model* Adjusted OR (95% CI)	*p*-value
Gender	Female	15.5 (92/592)	1.00		1.00	
	Male	20.4 (121/594)	1.39 (1.03 - 1.87)	0.031	1.41 (1.04 - 1.90)	0.028
Ethnicity	Black	20.3 (181/890)	1.00		1.00	
	White	7.0 (6/86)	0.29 (0.13 - 0.68)	0.005	0.29 (0.12 - 0.68)	0.005
	Coloured	14.2 (20/141)	0.65 (0.39 - 1.07)	0.089	0.59 (0.35 - 1.00)	0.050
	Asian	8.7 (6/69)	0.37 (0.16 - 0.88)	0.023	0.32 (0.13 - 0.78)	0.011
Low birth weight (kg)	≥2.5	17.0 (185/1 091)	1.00		1.00	
	<2.5	30.8 (28/91)	2.18 (1.36 - 3.49)	0.001	2.25 (1.32 - 3.83)	0.003
	Missing	0 (0/4)	Insufficient data		Insufficient data	
Premature birth (wks)	≥37	17.0 (176/1 034)	1.00		1.00	
	<37	27.5 (30/109)	1.85 (1.18 - 2.90)	0.007	1.37 (0.83 - 2.26)	0.223
	Missing	16.3 (7/43)	0.95 (0.42 - 2.16)	0.899	1.61 (0.67 - 3.89)	0.289
Maternal age at delivery (yrs)	<20	24.6 (45/183)	1.00		1.00	
	20 - 43	16.7 (1 68/1 003)	0.62 (0.42 - 0.90)	0.012	0.68 (0.46 - 1.00)	0.050

*N=1 182. Model of adjusted odds ratios is adjusted for all variables in the model.

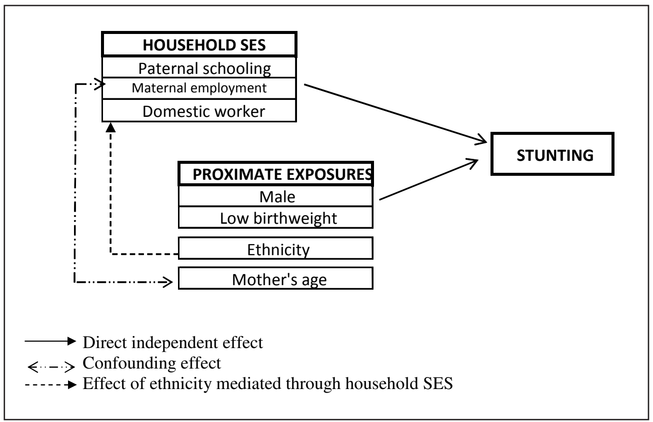


Fig. 2. Direct effect of household SES and the direct and confounded effects of proximate exposures on stunting in children aged <30 months.

multivariable model (*N*=1 182) are adjusted for all variables in the model, and indicate that children whose fathers had completed secondary school (AOR=0.59, 95% CI 0.40 - 0.85), whose mothers were employed (AOR= 0.60, 95% CI 0.40 - 0.88) and whose parents employed a domestic worker (AOR=0.40, 95% CI 0.19 - 0.83) were at reduced likelihood of stunting, while male children (AOR=1.40, 95% CI 1.03 - 1.91) and those born with LBW (AOR=2.56, 95% CI 1.54 - 4.26) were at increased likelihood of stunting (Table III).

Likelihood ratio tests comparing nested models indicated that these SES measures significantly added to the final model (χ^2=35.7, p=0.001). There was little difference between ORs on stunting before proximate exposures were included (Table II) and those seen after their inclusion (Table III), suggesting that the effects of these SES variables were not mediated though gender or LBW delivery (Fig. 2). The use of a conceptual framework also helped to illustrate that the crude effect of ethnicity on stunting was mediated through mother's employment, father's education and parents who could afford to employ a domestic worker, and that the effect of mother's age was confounded by maternal employment status (Fig. 2).

Discussion

We examined the association between early life measures of household SES and stunting in a population-based sample of 1 186 urban South African children aged <30 months. The prevalence of stunting was 18.0%, which is lower than recent national estimates of 25.5% for children aged <3 years, using National Center for Health Statistics (NCHS)/WHO 1978 growth references.[2] Children from rural and urban areas were included in these national estimates, and the influence of untreated paediatric HIV infection might have caused a rise in prevalence, compared with our estimates dating from the early 1990s.

Maternal employment, paternal education and employment of a domestic worker showed protective effects on stunting. As illustrated by the conceptual framework, the effect of these SES variables was not mediated through the proximate variables of gender or LBW delivery. However, from the results of other studies, it is expected that if likely mediators such as nutrition, breastfeeding, weaning, morbidity (including untreated paediatric HIV infection), and use of health services were available, the effect on stunting of the SES variables significant in this study would be mostly indirect.

Maternal employment has a complex relationship with childhood stunting, and the cessation or interruption of exclusive breastfeeding may have a large negative effect on the growth of infants and young toddlers.[14] Our results are consistent with studies that have reported a protective effect from maternal employment, showing that the increased income and increased female autonomy associated with employment may positively influence food security, diet quality[15] and use of health services.[16]

Although the pathways through which paternal education may influence stunting have been less frequently investigated, work from Indonesia and Bangladesh suggests that these may include health-promoting behaviours such as childhood vaccination, family planning, attendance at the local health clinic and vitamin A supplementation.[17] Among the Bt20 families, paternal education was strongly correlated with maternal education level. Extensive research from developing countries on the role of maternal education suggests that it may influence child growth and health through better feeding practices and home hygiene,[18] and health-seeking behaviour.[19] In the present study, the colinearity between paternal and maternal education resulted in attenuation of the effect of maternal education on child stunting.

In this study, the SES measure of employing a domestic worker is likely to be a marker of household wealth and disposable income. Proxy measures of household wealth frequently show associations with child growth in developing countries, and are suggested to act via improved nutrition and health-seeking behaviour.[20]

Unadjusted results from this study suggest a lower likelihood of stunting in children whose mothers believed that their family was ready for the pregnancy; however, when adjusted for maternal employment, this effect was no longer significant. Although the role of social support in child growth has not been widely investigated in African countries, studies report associations between low pregnancy commitment, low levels of social support, mistimed pregnancy and maternal depression,[21] which in turn show associations with poor levels of mother-infant/child interaction and stunting.[22] Previous work on the Bt20 study has show associations between mother's desire for her pregnancy and small-for-gestational-age delivery (<10th centile of birth weight for gestational age), suggesting that social support during pregnancy may influence child growth early in life in this urban South African context.[23]

Table II. Crude and adjusted measures of the effect of socio-economic and social support (distal) exposures on stunting in children aged <30 months

Household economic and social exposures	Category	Stunted 18.0% (213/1 186) % (stunted *N*/total)	Univariable analysis Crude OR (95% CI)	*p*-value	Forward-fitting model* Adjusted OR (95 % CI)	*p*-value
Mother's schooling	<Matriculation	20.6 (176/853)	1.00		1.00	
	Matriculation	11.1 (37/332)	0.48 (0.33 - 0.71)	<0.000	0.76 (0.49 - 1.16)	0.207
	Missing	0 (0/1)	Insufficient data		Insufficient data	
Partner's schooling	<Matriculation	20.6 (116/564)	1.00		1.00	
	Matriculation	12.0 (50/415)	0.53 (0.37 - 0.76)	0.001	0.64 (0.43 - 0.95)	0.027
	Missing/NA	22.7 (47/207)	1.13 (0.77 - 1.67)	0.520	0.96 (0.63 - 1.47)	0.865
Mother's work	Unemployed	24.3 (101/415)	1.00		1.00	
	Housewife	17.3 (51/295)	0.65 (0.45 - 0.95)	0.025	0.80 (0.53 - 1.23)	0.316
	Earns money	12.8 (60/467)	0.46 (0.32 - 0.65)	<0.000	0.59 (0.40 - 0.89)	0.011
	Missing	11.1 (1/9)	0.39 (0.05 - 3.14)	0.376	0.40 (0.03 - 4.69)	0.462
Frequency of partner's pay	Monthly	20.2 (71/351)	1.00		1.00	
	<Monthly	14.1 (62/441)	0.65 (0.44 - 0.94)	0.022	0.88 (0.59 - 1.32)	0.533
	Missing/NA	20.3 (80/394)	1.00 (0.70 - 1.44)	0.979	0.94 (0.64 - 1.39)	0.765
Water facility	Outdoor tap/ indoor cold tap only	20.6 (157/762)	1.00		1.00	
	Indoor hot tap	13.3 (55/415)	0.59 (0.42 - 0.82)	0.002	1.16 (0.66 - 2.01)	0.606
	Missing	11.1 (1/9)	0.48 (0.06 - 3.88)	0.493	0.52 (0.01 - 20.73)	0.729
Toilet facility	Pit latrine or outdoor flush toilet	20.6 (143/694)	1.00		1.00	
	Indoor flush toilet	14.3 (69/481)	0.65 (0.47 - 0.88)	0.006	0.95 (0.57 - 1.60)	0.851
	Missing	9.1 (1/11)	0.39 (0.05 - 3.03)	0.365	0.33 (0.01 - 13.10)	0.557
Cooking fuel used	Other (coal, paraffin, wood)	23.9 (50/209)	1.00		1.00	
	Electricity/ generator or gas	16.6 (162/973)	0.64 (0.44 - 0.91)	0.013	0.97 (0.65 - 1.43)	0.871
	Missing	25.0 (1/4)	1.06 (0.11 - 10.42)	0.960	0.78 (0.04 - 15.52)	0.873
Employ domestic worker	No	19.3 (177/919)	1.00		1.00	
	Yes	5.5 (10/183)	0.24 (0.13 - 0.47)	<0.000	0.38 (0.18 - 0.82)	0.013
	Missing/NA	31.0 (26/84)	1.88 (1.15 - 3.07)	0.012	2.15 (1.20 - 3.83)	0.010
Health insurance	No	20.1 (171/849)	1.00		1.00	
	Yes	10.8 (27/251)	0.48 (0.31 - 0.74)	0.001	1.10 (0.65 - 1.85)	0.733
	Missing/NA	17.4 (15/86)	0.84 (0.47 - 1.50)	0.551	0.57 (0.29 - 1.12)	0.105
Fridge in home	No	24.9 (84/338)	1.00		1.00	
	Yes	14.9 (125/840)	0.53 (0.39 - 0.72)	<0.000	0.72 (0.50 - 1.04)	0.077
	Missing	50.0 (4/8)	3.02 (0.74 - 12.36)	0.123	1.14 (2.19 - 5.94)	<0.000
Washing machine in home	No	20.1 (184/915)	1.00		1.00	
	Yes	9.7 (25/259)	0.42 (0.27 - 0.66)	<0.000	0.70 (0.40 - 1.21)	0.200
	Missing	33.3 (4/12)	1.99 (0.59 - 6.67)	0.267	Insufficient data	
Father reported resident	No father reported	21.2 (136/641)	1.00		1.00	
	Father reported	14.3 (77/537)	0.62 (0.46 - 0.84)	0.002	0.71 (0.36 - 1.41)	0.327
	Missing	0 (0/8)	Insufficient data		Insufficient data	
Mother's marital status	Single (never married)	20.4 (148/724)	1.00		1.00	
	Previously married	17.4 (4/23)	0.82 (0.27 - 2.44)	0.721	1.32 (0.40 - 4.41)	0.649
	Married	13.5 (58/430)	0.61 (0.44 - 0.84)	0.003	1.16 (0.70 - 1.92)	0.560
	Missing	33.3 (3/9)	1.95 (0.48 - 7.87)	0.351	4.69 (0.78 - 27.97)	0.090
Mother's cohabitation status	Not living with partner	21.4 (120/562)	1.00		1.00	
	Living with partner	14.7 (83/563)	0.64 (0.47 - 0.87)	0.004	0.96 (0.48 - 1.92)	0.901
	Missing	16.4 (10/61)	0.72 (0.36 - 1.46)	0.367	0.78 (0.35 - 1.72)	0.540
Mother's desire for pregnancy	Unsure/no	18.5 (127/688)	1.00		1.00	
	Yes, desires pregnancy	16.2 (74/458)	0.85 (0.62 - 1.17)	0.316	0.96 (0.67 - 1.37)	0.812
	Missing	30.0 (12/40)	1.89 (0.94 - 3.82)	0.075	2.49 (1.08 - 5.78)	0.033
Family and finances ready for pregnancy	Unsure/no	18.5 (66/357)	1.00		1.00	
	Yes	14.6 (140/961)	0.71 (0.51 - 0.98)	0.038	0.87 (0.60 - 1.24)	0.437
	Missing	63.6 (7/11)	1.20 (0.49 - 2.95)	0.688	1.34 (0.44 - 4.11)	0.611

*N=1 178. Model of adjusted odds ratios is adjusted for all variables in the model.
NA = not applicable, answer missing as subsequent part of a linking question.

Table III. Fully adjusted measures of the effect of demographic (proximate) and socio-economic (distal) exposures on stunting in children aged <30 months

Variables	Categories	Stunted 18.0% (213/1 186) % (stunted *N*/total)	Final model* Adjusted OR (95% CI)	*p*-value
Partner's schooling	<Matriculation	20.6 (116/564)	1.00	
	Matriculation	12.0 (50/415)	0.59 (0.40 - 0.85)	0.005
	Missing/NA	22.7 (47/207)	1.03 (0.69 - 1.54)	0.886
Mother's work	Unemployed	24.3 (101/415)	1.00	
	Housewife	17.3 (51/295)	0.76 (0.50 - 1.13)	0.173
	Earns money	12.8 (60/467)	0.60 (0.40 - 0.88)	0.010
	Missing	11.1 (1/9)	0.36 (0.04 - 3.03)	0.345
Employ domestic worker	No	19.3 (177/919)	1.00	
	Yes	5.5 (10/183)	0.40 (0.19 - 0.83)	0.015
	Missing/NA	31.0 (26/84)	1.87 (1.09 - 3.19)	0.022
Gender	Female	15.5 (92/592)	1.00	
	Male	20.4 (121/594)	1.40 (1.03 - 1.91)	0.032
Ethnicity	Black	20.3 (181/890)	1.00	
	White	7.0 (6/86)	0.68 (0.27 - 1.70)†	0.407
	Coloured	14.2 (20/141)	0.87 (0.50 - 1.51)	0.626
	Asian	8.7 (6/69)	0.50 (0.19 - 1.34)	0.167
Low birth weight (kg)	≥2.5	17.0 (185/1 091)	1.00	
	<2.5	30.8 (28/91)	2.56 (1.54 - 4.26)	<0.000
	Missing	0 (0/4)	Insufficient data	
Maternal age at delivery (years)	<20	24.6 (45/183)	1.00	
	20 - 43	16.7 (168/1 003)	0.81 (0.54 - 1.22)	0.305

*N=1 182. Model of adjusted odds ratios is adjusted for all variables in the model.
†Ethnicity was no longer significant due to the close association with SES, indicating effect of ethnicity on stunting was mediated through SES.
NA = not applicable, answer missing as subsequent part of a linking question.

The optimal growth of infants and young children has been identified in the Integrated Nutrition Policy, and reiterated in the South African National Health Plan 2007/2008, as a key public health priority. The relevance of stunting to child public health in South Africa is increased by the expanding HIV epidemic, the continuing risk of vertical transmission of the virus, and incomplete coverage of antiretroviral treatment for all infected infants and children.[6] Identifying context-specific socio-economic and social support risk factors for stunting in South Africa can contribute to fulfilling these priorities by identifying targets for policy. Based on results from this study, policies promoting parental education and employment are likely to improve child growth in this urban African context.

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