

PERINATAL EPIDEMIOLOGY

Decline in, and lack of difference between, average birth weights among African and Portuguese babies in Portugal

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Background	In preliminary data in Portugal, we found that African babies of migrant mothers were heavier than White Portuguese babies born in Lisbon. We investigate whether this pattern is replicated in the national data, and in addition the trends in birth weight in these groups.
Methods	<i>Design and setting:</i> Births registered between 1995 and 2002 classified by reported nationality of mothers. <i>Participants:</i> 849 595 Portuguese births ('Portuguese' nationality, predominantly of European descent) and 22 463 African births ('Angola', 'Cape Verde', or 'Guinea Bissau, Republic of Guinea or Equatorial Guinea' nationality, predominantly of African origin).
Results	Among Portuguese births, there was a decline in births to teenaged mothers and an increase to mothers aged ≥ 35 years, with >9 years of education or in a non-manual class, but among African births there was an increase in births to teenaged mothers and a decline to mothers from advantaged socioeconomic backgrounds. Using the Wilcoxon–Russell method, overall mean birth weights of term Portuguese (3303, SD 424 g) and African (3297, SD 441 g) babies were not different but the percentage of small preterm births was higher among African (4.7%) than among Portuguese (2.9%) births. Between 1995 and 2002, mean birth weight of term Portuguese babies declined by 58 g (3334–3276 g) and of African babies by 57 g (3341–3284 g). The left shift of the birth weight distributions was independent of maternal age, parity, and social factors among Portuguese babies, but among African babies the decrease appeared to be associated with socioeconomic advantage.
Conclusion	There has been a downward trend in birth weights in Portugal among both Portuguese and African term births, but average birth weights of the two groups were similar.
Keywords	Declining birth weights, Portugal, Portuguese and African babies

Introduction

African–White differences in birth weight in countries such as the United States^{1–3} and the United Kingdom^{4–6} are a long-debated epidemiological issue, but the mechanisms underlying these disparities are still not well understood. It is unclear to what extent lower birth weight among African infants is related to genetic or social factors. This is an issue of considerable public health importance. Birth weight is associated with both short- and long-term complications. For example, low birth weight (LBW) among preterm infants is associated with poor perinatal survival and neonatal complications.⁷ Lower birth weight is also

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associated with hypertensive and other chronic diseases in later life although the degree of association is controversial.^{8–10} Higher birth weight among term infants is associated with birth complications (e.g. obstructive labour and forceps delivery), gestational diabetes in the mother, and also with obesity in adulthood.¹¹ The high prevalence of diabetes and hypertension in African-origin people is well known^{12–14} and the relationship between constrained intrauterine growth and chronic diseases in later life is under intense debate.¹⁵

International comparisons of minority populations of similar heritage in different societal contexts are useful, since different outcomes suggest that some environments are more or less health-promoting than others. Portugal provides an interesting historical, sociopolitical context to study African–White differences in birth weight. Though still relatively poor compared with other European countries, Portugal has undergone rapid societal changes since its political revolution in 1974, with dramatic improvements in the standard of living.^{16,17} Little is known about the ethnic differences in Portugal's perinatal outcomes. We recently reported that in Lisbon mean birth weight of term babies of migrant Africans was higher than that of White babies, while that of babies of Portugal-born African mothers was intermediate.¹⁸ Higher levels of smoking in pregnancy among White Portuguese women contributed to these patterns. However, if replicated this finding would have major implications for the debate over the balance between genetic and environmental factors determining fetal maturity and birth weight in people of West African origin in general—whose burden of later cardiovascular disease emerges rapidly in developing country settings.

To our knowledge, temporal trends in birth weight have never been examined in Portugal—nationally or among African infants. Since 1995, nationality of the mother has been recorded at birth registration in sufficient detail to allow infants of mothers born in the ex-colonies of Portugal (Angola, Cape Verde, Guinea Bissau), Republic of Guinea and Equatorial Guinea to be identified. Gestational age and sociodemographic characteristics, factors associated with birth weight, are also recorded at the registration of the births. The aims of this study were to examine (i) whether the recently observed African–White differences in birth weights in Lisbon are replicated at a national level, (ii) temporal shifts in the birth weight distributions of babies of Portuguese and African mothers, and (iii) the factors influencing any changes in birth weights in these groups. We tested the hypotheses that birth weights of term babies of migrant African mothers would be heavier than those of Portuguese mothers but the prevalence of preterm babies would be higher, that there would be a right shift in the birth weight distribution for both groups, and that the improvement in maternal social circumstances would influence the right shift of the distributions.

Methods

The Instituto Nacional de Estatística (INE) in Portugal provided us with information on births registered between 1995 and 2002. After delivery of a baby in Portugal, the hospital issues a certificate with details of the birth to the mother, which she then uses to register the birth at the registry office. Between 1995 and 2000, INE coded birth weight in 500 g categories but from

2001 this variable has been recorded as a continuous variable in their statistical files. Analyses of the birth weight distributions were therefore limited to categorical birth weight data (500 g categories).

A total of 887 272 live singleton births were registered between 1995 and 2002. We excluded 5200 births because of missing information on nationality. Of the remaining births, we identified 852 467 births to mothers who reported Portuguese nationality and 22 609 births to mothers who reported 'Angola' (16 329), 'Cape Verde' (4412), or 'Guinea Bissau, Republic of Guinea, Equatorial Guinea' (1868) as their nationality. Less than 1% of births were then excluded for both Portuguese (0.3%) and Africans (0.6%). The exclusions included 2912 births (2781 Portuguese, 131 African) with missing information on birth weights, 42 births (40 Portuguese, 2 African) that were <500 g, and 67 births (54 Portuguese, 13 African) that occurred to mothers aged ≤13 years or >49 years. Births in the category <500 g were excluded because of the possibility of error in data entry, given that these were recorded as live births. Maternal age was censored to reflect a plausible reproductive age span. The final sample of births classified as Portuguese was 849 595 and as African was 22 463. Missing data for most variables were coded as 'unknown' to prevent bias that may have resulted from excluding the birth records or variables. With the exception of parity (we did not have information on stillbirths so parity is defined here as the number of previous live births) and age of mother, data on most of the potential correlates were also provided as categorical data. Gestational age was provided in categories as <22, 22–27, 28–31, 32–36, 37–41, and >41 weeks. Gestational age was derived by the obstetricians using date of last menstrual period but ultrasound scans were used if the mother could not recall this or if there appeared to be a discrepancy between intrauterine growth and estimated gestational age. Term babies were classified as those that were 37–41 weeks of gestation at birth and preterm babies as <37 weeks. Age of mother at registration of the birth was categorized in 5-year age bands. The proxy variables used to measure socioeconomic circumstances were occupational class (classified as non-manual, manual, unclassified), number of years of education (classified as ≤9 years and >9 years), and registration status (births that occurred inside marriage, births that occurred outside marriage and jointly registered by both parents, and births that occurred outside marriage and registered by only the mother, and unknown registration status). Paternal occupation class was used if information on maternal occupational class was missing. Low birth weight refers to birth weight <2500 g.

The distribution of birth weights is not a single distribution but a 'normal' (Gaussian) distribution (comprising mainly of term births) with a secondary distribution of births with pathologically low weights mainly attributable to preterm births. The Wilcoxon–Russell method^{19,20} mathematically separates the residual distribution from the main distribution so that the percentage of preterm LBW babies in the population can be estimated from the percentage of babies allocated to the residual distribution. Further details of the method and the software used to extract these distributions can be obtained from the website <http://eb.niehs.nih.gov/bwt/index.htm>. Given that ultrasound was not always used to determine gestational age, we used this method to estimate the percentage of small preterm births and mean birth weights of the normal distribution in each year. As we did not

Table 1 Temporal trends in factors associated with birth weight (Portugal, 1995–2002)

	Babies of Portugal-born mothers					Babies of migrant African mothers				
	1995–96	1997–98	1999–2000	2001–02	<i>P</i> -value ^a	1995–96	1997–98	1999–2000	2001–02	<i>P</i> -value ^a
All singleton births (<i>n</i> = 100%)	207 421	215 104	219 164	207 906		4826	5820	5737	6080	
Mean parity	1.69	1.67	1.62	1.63	<0.0005	2.04	2.05	2.01	1.98	0.0284
% Births to mothers aged ≤19 years	7.37	6.73	6.37	6.07	<0.0005	6.69	6.53	7.50	7.83	0.017
% Births to mothers aged 20–34 years	82.52	82.12	80.86	79.86	<0.0005	78.78	76.99	76.75	75.90	0.004
% Births to mothers aged >35 years	10.11	11.16	12.77	14.08	<0.0005	14.53	16.48	15.76	16.27	0.028
% >9 years of education	27.57	32.37	36.36	40.70	<0.0005	33.49	33.95	26.76	25.18	<0.0005
% Non-manual class	34.68	36.59	33.93	36.39	<0.0005	35.06	33.62	20.40	17.72	<0.0005
% Births outside marriage, joint registration	13.32	14.06	14.89	17.46	<0.0005	50.99	50.17	54.51	56.02	<0.0005
% Births outside marriage, single registration	4.35	4.64	5.13	5.19	<0.0005	9.45	11.20	13.54	17.86	<0.0005

^a Chi-squared test for linear trend used for comparison of proportions and linear-contrast analysis of variance used for comparison of means.

have access to continuous birth weight data for the entire period, polytomous models,²¹ suitable for examining outcomes with ordinal categories, were used to examine the potential effect of biological (maternal age, gestational age, and parity) and social (level of education, occupational class, and registration status) factors on trends in birth weight categories (<2500, 2500–2999, 3000–3999, 4000+ g). The odds ratios obtained from the polytomous models reflect average proportional changes in the birth weight categories per year relative to changes in the baseline category 3000–3999 g. In bivariate analyses stratified by nationality, biological and social factors were significantly associated with birth weight, with generally larger effects observed for the biological than the social factors. Given that the distribution of these factors changed over time for both groups, it was important to examine whether they affected the trends in birth weights. The impact of biological factors on the trends was first examined in a model with only year of birth, gender, maternal age, gestational age, and parity. The additional impact of social factors on the trends was then examined by adding level of education, occupational class, and registration status. To avoid potential residual confounding, the models were stratified by nationality to examine whether the influences on trends in birth weights differed between the two groups. Nationality may be a determinant of socioeconomic status and adjustment for it in models containing both nationality and SES or other factors (e.g. maternal age) could obscure the relationship between the exposure and the outcome within the groups.

Results

Table 1 shows trends in potential determinants of birth weight by two-yearly intervals for the period 1995–2002. The average number of previous live-born infants declined among Portuguese and African mothers, but remained higher among African mothers. Among Portuguese infants, there was a decline of births among teenaged and 25- to 34-year-old mothers and an increase

Table 2 Trends in birth weights, according to the method proposed by Wilcox and Russell (Portugal, 1995–2002)

Year	Babies of Portugal-born mothers		Babies of migrant African mothers	
	Term [mean (SD)]	Small preterm (%)	Term [mean (SD)]	Small preterm (%)
1995	3334 (427)	2.6	3341 (426)	5.0
1996	3333 (424)	3.6	3307 (438)	3.8
1997	3315 (421)	2.8	3302 (439)	4.7
1998	3305 (426)	2.9	3309 (446)	4.2
1999	3305 (421)	3.4	3319 (433)	6.3
2000	3311 (426)	3.4	3293 (445)	4.5
2001	3268 (444)	2.0	3279 (476)	2.4
2002	3276 (438)	2.2	3284 (457)	4.9
All years	3303 (424)	2.9	3297 (441)	4.7

among those aged 35 years and over, but among Africans there was an increase in births to both teenaged and older mothers. Trends by education and class also differed between these groups. There was a rise in the proportion of births among Portuguese mothers with >9 years of education or in a non-manual class, but among Africans there was a decline in the proportion of births with mothers in these socioeconomic categories. There was an increase in births outside marriage (both single and joint registrations) among both groups. But these births accounted for less than a quarter of all births among Portuguese infants; they accounted for more than half of all births among African infants.

Table 2 shows mean birth weight of term babies and the percentage of small preterm babies by year, calculated using the Wilcox–Russell’s method. Overall for the entire period, mean birth weight of term Portuguese babies was not significantly different from that of term African babies, but the percentage of small preterm babies was higher among African babies

Table 3 Multivariate analyses to show average proportional change in birth weight category relative to 3000–3999 g birth weight category per year among live singleton births (Portugal, 1995–2002)

		Odds ratio (95% CI)		
		<2500 g	2500–2999 g	4000+ g
Babies of Portugal-born mothers				
All births				
<i>n</i>		47 565	171 888	49 750
Adjusted for gender		1.03 (1.03–1.03)****	1.02 (1.02–1.03)****	0.97 (0.97–0.98)****
+ maternal age, parity, gestation		1.06 (1.06–1.07)****	1.03 (1.03–1.03)****	0.97 (0.96–0.97)****
+ social factors ^a		1.06 (1.05–1.06)****	1.02 (1.03–1.03)****	0.97 (0.97–0.97)****
Term births				
<i>n</i>		25 930	155 061	45 536
Adjusted for gender		1.03 (1.02–1.03)****	1.02 (1.02–1.03)****	0.95 (0.95–0.96)****
+ maternal age, parity, gestation		1.03 (1.02–1.03)****	1.03 (1.02–1.03)****	0.95 (0.95–0.96)****
+ social factors ^a		1.02 (1.02–1.03)****	1.02 (1.02–1.03)****	0.96 (0.95–0.96)****
First born births				
<i>n</i>		28 592	102 485	20 672
Adjusted for gender		1.03 (1.02–1.04)****	1.02 (1.02–1.02)****	0.98 (0.97–0.99)****
+ maternal age, parity, gestation		1.06 (1.05–1.07)****	1.03 (1.02–1.03)****	0.97 (0.97–0.99)****
+ social factors ^a		1.06 (1.05–1.06)****	1.02 (1.02–1.03)****	0.97 (0.97–0.98)****
Babies of migrant African mothers				
All births				
<i>n</i>		1780	4529	1449
Adjusted for gender		1.03 (1.01–1.05)**	1.02 (1.01–1.04)**	0.99 (0.97–1.01)
+ maternal age, parity, gestation		1.04 (1.01–1.06)**	1.02 (1.01–1.04)**	0.99 (0.96–1.01)
+ social factors ^a		1.03 (1.00–1.06)	1.01 (1.00–1.03)	0.98 (0.96–1.01)
Term births				
<i>n</i>		910	4111	1318
Adjusted for gender		1.02 (0.99–1.06)	1.02 (1.01–1.04)**	0.97 (0.94–0.99)*
+ maternal age, parity, gestation		1.02 (0.99–1.06)	1.02 (1.01–1.04)**	0.97 (0.94–0.99)*
+ social factors ^a		1.01 (0.98–1.05)	1.01 (1.00–1.03)	0.96 (0.94–0.99)*
First live-born births				
<i>n</i>		888	2285	479
Adjusted for gender		1.04 (1.01–1.07)*	1.03 (1.01–1.06)**	1.00 (0.96–1.04)
+ maternal age, parity, gestation		1.04 (1.00–1.08)*	1.03 (1.01–1.06)**	0.99 (0.95–1.03)
+ social factors ^a		1.03 (0.99–1.07)	1.02 (1.00–1.05)	0.99 (0.95–1.04)

P-values: * <0.05; ** <0.01; *** <0.001; **** <0.0005.

^a Social factors are occupational class, level of education, and registration status.

($P < 0.05$). Term Portuguese babies were heavier than African babies only in 1996 (26 g) and 2000 (18 g) ($P < 0.05$). Between 1995 and 2002, mean birth weight of term Portuguese babies declined by 58 g and of African babies by 57 g. There were sharp average falls of 43 g between 2000 and 2001 among Portuguese babies, and of 34 g between 1995 and 1996 and of 26 g between 1999 and 2000 among African babies. The percentage of small preterm babies was significantly higher among African babies in all years ($P < 0.05$) but 1996 and 2001. Within the groups, there was no consistent trend in the percentage of small preterm babies.

Table 3 shows the trends for birth weight categories (<2500, 2500–2999, 4000+ g) as odds ratios relative to the birth weight

category 3000–3999 g, adjusted for gender and gestational age of infant, and parity and age of mother, and additionally adjusted for socioeconomic circumstances, for all births, and term and first births. These odd ratios reflect average proportional change in the birth weight category relative to the 3000–3999 g category. Among Portuguese infants, adjustments for biological or social factors did not alter the trend of a left shift in the birth weight distribution. Relative to the 3000–3999 g category, LBW and 2500–2999 g birth weight categories increased by 3 and 2%, respectively, among term births, whereas there was a relative decrease of 5% in the 4000+ g category. Among African babies that were term, similar left shift of the distribution was evident although the relative increase in LBW babies was not

Table 4 Multivariate analyses to show average proportional change in birth weight category relative to 3000–3999 g birth weight category per year by factors associated with birth weight, among term births (Portugal, 1995–2002)

	<2500 g		2500–2999 g		4000+ g	
	<i>n</i>	Odds ratio ^a (95% CI)	<i>n</i>	Odds ratio (95% CI)	<i>n</i>	Odds ratio (95% CI)
Babies of Portugal-born mothers						
Gender						
Male	11 288	1.02 (1.02–1.03)****	66 912	1.02 (1.02–1.03)****	30 403	0.95 (0.95–0.96)****
Female	14 642	1.02 (1.02–1.03)****	88 149	1.02 (1.02–1.03)****	15 133	0.95 (0.95–0.96)****
Maternal age						
Births to mothers aged ≤19 years	2418	0.98 (0.96–1.00)	12 493	0.99 (0.98–1.00)	1744	0.97 (0.95–0.99)*
Births to mothers aged 20–34 years	20 154	1.01 (0.97–1.05)	125 053	1.02 (1.00–1.04)	36 814	0.96 (0.93–0.99)**
Births to mothers aged ≥35 years	3358	1.02 (0.94–1.10)	17 515	1.01 (0.96–1.05)	6978	0.97 (0.91–1.03)
Social factors						
Births to mothers with >9 years of education	7405	1.04 (1.03–1.05)****	52 808	1.03 (1.02–1.03)****	14 000	0.94 (0.94–0.95) ****
Births to mothers with ≤9 years of education	18 527	1.02 (1.02–1.03)****	102 253	1.02 (1.02–1.03)****	31 536	0.96 (0.96–0.97)****
Births to mothers in a non-manual class	7313	1.04 (1.03–1.05)****	52 083	1.03 (1.03–1.04)****	14 765	0.94 (0.94–0.95)****
Births to mothers in a manual class	17 255	1.02 (1.01–1.03)****	97 252	1.02 (1.02–1.02)****	29 677	0.96 (0.96–0.97)****
Births to mothers not classified to class	1362	1.02 (0.99–1.06)	5726	1.02 (1.00–1.04)	1094	0.97 (0.94–1.01)
Births inside marriage	18 570	1.03 (1.02–1.04)****	119 249	1.03 (1.02–1.03)****	38 107	0.95 (0.95–0.96)****
Births outside marriage	5319	1.01 (0.99–1.02)	26 630	1.01 (1.01–1.02)****	5878	0.96 (0.95–0.98)****
Births, registration status unknown	2041	1.00 (0.98–1.03)	9182	1.00 (0.98–1.01)	1551	0.95 (0.93–0.98)
Babies of migrant African mothers						
Gender						
Male	406	1.02 (0.97–1.07)	1747	1.01 (0.98–1.03)	862	0.96 (0.93–0.99)*
Female	504	1.01 (0.96–1.05)	2364	1.02 (1.00–1.04)	456	0.97 (0.93–1.02)
Maternal age						
Births to mothers aged ≤19 years	94	1.05 (0.91–1.20)	404	1.02 (0.95–1.09)	30	1.20 (0.95–1.51)
Births to mothers aged 20–34 years	637	1.01 (0.97–1.05)	3103	1.02 (1.00–1.04)	1045	0.96 (0.93–0.99)**
Births to mothers aged >35 years	179	1.02 (0.94–1.10)	604	1.01 (0.96–1.05)	243	0.97 (0.91–1.03)
Social factors						
Births to mothers with >9 years of education	204	1.06 (0.99–1.14)	1080	1.04 (1.01–1.08)*	408	0.94 (0.89–0.98)*
Births to mothers with ≤9 years of education	706	1.00 (0.96–1.04)	3031	1.01 (0.99–1.03)	910	0.98 (0.94–1.01)
Births to mothers in a non-manual class	183	1.07 (1.00–1.14)	886	1.04 (1.01–1.08)*	353	0.94 (0.89–0.99)*
Births to mothers in a manual class	648	1.00 (0.96–1.04)	2931	1.01 (0.99–1.03)	905	0.97 (0.94–1.00)
Births to mothers not classified to class	79	0.98 (0.83–1.15)	294	1.02 (0.93–1.12)	60	1.03 (0.89–1.19)
Births inside marriage	248	1.04 (0.98–1.11)	1225	1.04 (1.01–1.07)**	511	0.94 (0.90–0.98)**
Births outside marriage	508	1.00 (0.96–1.04)	2236	1.00 (0.98–1.02)	691	0.98 (0.95–1.02)
Births, registration status unknown	154	0.96 (0.88–1.05)	650	1.00 (0.95–1.05)	116	1.02 (0.93–1.13)

P-values: * <0.05; ** <0.01; *** <0.001; **** <0.0001 (approximately adjusted for all other variables but the stratifying variable).

^a Odds ratios are adjusted for all variables except the stratifying variable.

significant. The increase among 2500–2999 g birth weights was associated with social factors but the relative decrease among 4000+ g was independent of this. Increases in the <3000 g among first born babies also appeared to be associated with social factors.

Given the different trends in maternal age and socioeconomic circumstances for Portuguese and Africans, we stratified the models by selected factors associated with birth weight. Table 4 shows trends in birth weight categories relative to the birth weight category 3000–3999 g for term births, adjusted for all factors other than the stratifying variable. As in Table 3, these odds ratios reflect average proportional change relative to the

3000–3999 g category. Among Portuguese babies, increases in birth weight categories <3000 g were not associated with maternal age. Apart from births outside marriage, declines were consistently observed across other stratifying variables. Among African infants, the only significant shifts were among births to mothers who were in better socioeconomic circumstances and to those registered inside marriage.

Discussion

To our knowledge this is the first study of trends in birth weights among African and Portuguese babies in Portugal. Using the

Wilcox–Russell method, mean birth weight of term Portuguese babies was similar to that of African babies but the percentage of small preterm babies was higher among African babies.

Between 1995 and 2002, birth weights declined among both Portuguese and African term babies, evident from a decline in average birth weights and a left shift of the whole distribution. The test of our third hypothesis suggested that among African babies the left shift was associated with maternal socioeconomic advantage.

Our findings of a downward trend in average birth weight among Portuguese infants were unexpected. An important limitation of these analyses is that birth weight data were only available in 500 g categories for most of the years. Overall trends by these categories obscure changes within categories. Arguably, the mean birth weights derived using the Wilcox–Russell method could also have an element of inaccuracy as the mean was derived using 500 g categories. The increase in years of education and proportions in non-manual class among Portuguese women is consistent with a general improvement in standard of living and income in Portugal.¹⁶ On the other hand, increasing disadvantage was evident among African mothers—decline in years of education and occupational class position, and increase in sole registration births. In 1995/96, African mothers were more likely to have more than 9 years of education than Portuguese mothers but this advantage disappeared by 1999/2000. This could reflect temporal changes in the nature of immigration with a possible decline in the positive selection of migrants, such that recent migrants could have been less healthy than earlier migrants. Such an increase in negative selection could contribute to the decline in birth weights among babies of African mothers, although this is unlikely to explain the trends given that the decline was evident only among those in better social circumstances.

Findings from other studies have suggested that a rise in LBW infants and a decline in mean birth weight is associated with changes in obstetric practices and that women with higher education are more likely to have access to medical care and to receive medical interventions.^{22,23} Data on obstetric management are not collected in the national birth registration system in Portugal. In 2001, 30% of all births in Portugal were caesarean, and in private hospitals more than half of all births were caesarean. There is no official data on reasons for this high caesarean rate. In our Lisbon-based study¹⁸ the proportion of births that were caesarean was similar for African and White babies, and in both groups babies delivered by caesarean appeared to be heavier than those delivered vaginally, suggesting that elective caesarean influences obstetric management. We suspect that although an increase in caesarean sections may have resulted in a rise of surviving LBW babies, it is unlikely to explain the downward trend in birth weights among term babies. Advances in medical technology are more likely to have contributed to the rise in LBW babies that were preterm. Further studies addressing the role of medical interventions in Portugal are warranted.

Nationality and not ethnicity of the mother is collected in the national birth registration in Portugal. This means that some mothers who reported 'Angola', 'Cape Verde', or 'Guinea' as their nationality could therefore be of White ethnicity. The mean birth weights of term babies (based on the Wilcox–Russell method) we reported for babies born in two large municipalities

in Greater Lisbon and classified by ethnicity (rather than nationality of mother) were 3252 g (SD 463 g) for White Portuguese and 3307 g (SD 456 g) for babies of migrant Black African mothers.¹⁸ Using ethnicity rather than nationality therefore suggests that Black African babies of migrant mothers were heavier than White Portuguese babies. If babies of White Angolan/Cape Verdean mothers are lighter than those of African mothers from these countries, the birth weight of babies of migrant African mothers reported here could be underestimated. This might contribute to the lack of difference in birth weights between babies of Portuguese and migrant African mothers. The differences in findings between the local and national studies could be due not only to the differences in classification of mothers but also to regional differences in birth weights.

High levels of smoking during pregnancy among Portuguese women could promote these downward trends in birth weight among term infants. Data on smoking are not collected in the national birth registration system but in our Lisbon-based study 21% of Portuguese mothers smoked during pregnancy compared with 6% among migrant Black African mothers. Babies of White Portuguese mothers who smoke were ~160 g lighter than babies of non-smokers. Among migrant Africans, smoking was not associated with birth weight. Findings from the National Health Survey in Portugal suggest an increase in smoking among women aged 35–44 years over the last 5 years.²⁴ If the prevalence of smoking during pregnancy has increased substantially since 1995 among Portuguese mothers, then some effect on the trends for Portuguese infants could be expected.

Societies that undergo rapid economic change may not experience corresponding improvements in birth weights for some time. Studies of birth weights in Vienna²⁵ and Montreal²⁶ in the 1800s showed a downward trend in birth weights in a period of general economic improvement. Recently, babies in Brazil have been found to be getting lighter, partly related to an increase in preterm births.²³ Primate studies of vertical generations of mothers and offspring suggest that the mother's own gestational experience might influence the uterine environment she provides for her offspring.²⁷ In this model of maternal transmission of reproductive health capital, a lag in improvement of birth weight could be expected in transitional societies. In the case of Portugal, the generations of mothers and daughters that could be expected to be exposed to relatively healthier uterine environments would have been born in the 1990s following the dramatic social changes in the previous two decades, so that tangible improvements could occur over the next decade. Thus it seems likely that as yet White Portuguese infants have had somewhat suppressed fetal growth and hence lighter birth weights at term than White babies born in the UK, but babies of African-origin migrants reported here are relatively heavier than elsewhere, for example by some 200 g than typically found in African-origin infants in the West Indies.²⁸

Conclusion

In conclusion, our findings suggest that there has been a downward trend in birth weights in Portugal among both Portuguese and African term babies. Further in-depth studies of trends in obstetric management and in social and biological factors in Portugal are warranted to understand these trends.

KEY MESSAGES

- Lighter birth weights among African babies than White babies in the United States and the United Kingdom are a long-debated epidemiological issue. This study examined mean birth weights among African babies and Portuguese babies in Portugal over the years 1995–2002.
- Mean birth weight of African babies was not lower than White Portuguese babies but the prevalence of small preterm babies was higher among African babies. Mean birth weight of term babies declined between 1995 and 2002 in both groups, by 58 g for Portuguese babies and 57 g for African babies. The decline among African babies was linked to socioeconomic advantage.
- The lack of African–White difference in Portugal suggests that environmental rather than genetic factors contribute to the differences observed elsewhere. Further in-depth studies of trends in obstetric management and in social and biological factors in Portugal are warranted to understand the downward drift in the birth weight distributions.

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