BIRTH WEIGHT, MATERNAL AGE, AND PARITY AMONG THE AFRICAN POPULATION OF UGANDA

BY

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This report presents data on birth weight, maternal age, and parity among the African population of Uganda. The babies were born in the maternity wards at Mulago Hospital, Kampala, the teaching hospital of the University College of East Africa (Makerere College). Kampala is 4,000 feet above sea level, situated on the North shore of Lake Victoria, and has about 40,000 inhabitants. Women are admitted for both normal and abnormal delivery and come from many tribes, the Baganda forming the largest group. Antenatal clinics are held but many who attend wait until labour starts before coming into hospital.

MATERIAL

2,068 consecutive newborn babies were examined for congenital deformities between December, 1956, and September, 1957, by Simpkins and Lowe (1961). The babies were weighed to the nearest ounce by the hospital staff within a few minutes of birth. The scales were tested for accuracy each month. Data were available for analysis from 1,905 of these babies and their mothers. There were 1,008 males, 897 females, 52 twin births, and two sets of triplets. 141 babies were stillborn and data were available for 104 of these babies (66 males and 38 females) and their mothers. No information could be obtained for neonatal deaths, as it was impracticable to follow the progress of the infants for 28 days. Information on birth weight, maternal age, and parity was obtained from 1,528 maternities. The term parity is used to indicate the number of previous maternities resulting in live or stillborn babies. The mothers came from various ethnic groups as set out in Table I. The ratio of males to females for total births is 1·12:1 and as in other African series this is higher than that seen in British babies (1·06:1; Lowe and McKeown, 1951), Chinese (1·06:1; Millis and You Poh Seng, 1954), Indians born in Singapore (1·05:1; Millis, 1959), and Indians born in Southern India (1·04:1, Namboodiri and Balakrishnan, 1959).

TABLE I
DISTRIBUTION OF NEWBORNS AMONG DIFFERENT ETHNIC GROUPS

Ethnic Group		Males	Females	Sex Ratio M:F	Total
Bantu		807	721	1·12:1	1,528
Non-Bantu	Nilotic	93	84	1·14:1	177
	Sudanese	40	37		77
	Bahutu	52	49		101
	Nilohamitic	16	6		22
All Groups		1,008	897	1·12:1	1,905

OBSERVATIONS

BIRTH WEIGHT, MATERNAL AGE, AND PARITY

The means and standard deviations for birth weights, mother's age, and parity are set out in Table II (opposite). The African babies have a mean birth weight of $6\cdot57 \pm 0\cdot03$ lb. for total births and a mean birth weight of $6\cdot59 \pm 0\cdot03$ lb. for live births. These figures may be compared with the observations of other workers for live births set out in Table III (opposite).

Salber and Bradshaw (1951) give figures for the mean birth weight of European, Bantu Coloured, and Indian babies in Durban and Capetown, South Africa. They also quote the figures of other workers but it is not clear whether these are the mean birth weights of total births or live births, though they excluded multiple births from their own series. These figures are set out in Table III. It has been suggested that differences in both economic status and race may bear on the variations in birth weight which have been observed in different parts of the world. In this connexion it is interesting to note that the mean birth weight of the South African Bantu is higher than that of the Bantu in Uganda.

The stillborn babies are significantly lighter at birth ($6\cdot24 \pm 0\cdot164$ lb.). The mean age of their mothers is not significantly different from that of mothers having live babies, and the parity in the two

TABLE II
MEANS AND STANDARD DEVIATIONS OF THREE VARIABLES FOR (a) ALL BIRTHS, (b) LIVE BIRTHS, (c) MULTIPLE BIRTHS, (d) STILLBIRTHS, (e) LIVE BIRTHS EXCLUDING MULTIPLE BIRTHS (b)-(c), AND DIFFERENCES (d)-(b)

Births	No.	Birth Weight (lb.)		Mother's Age (yrs)		Parity	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
(a) All Births	1,905	6.57 ± 0.028	1.21	23.31 ± 0.119	5.19	1.34 ± 0.035	1.55
(b) Live Births	1,801	6.59 ± 0.028	1.17	23.30 ± 0.120	5.11	1.34 ± 0.036	1.54
(c) Multiple Births	110	5.00 ± 0.118	1.18	25.65 ± 0.663	4.76	1.83 ± 0.193	1.37
(d) Stillbirths	104	6.24 ± 0.164	1.63	24.23 ± 0.513	5.13	1.36 ± 0.164	1.64
(e) Live Births excluding Multiple Births (b)–(c)	1,691	6.69 ± 0.026	1.08	23.23 ± 0.012	5.1	1.32 ± 0.037	1.54
Differences (d)–(b)	In mean weight (lb.)			In mean age (yrs)		In Parity	
	−0.35 ± 0.166 0.05 > P > 0.025			+0.93 ± 0.515 0.1 > P > 0.05		0.02 ± 0.204 P > 0.5	

TABLE III
PARTICULARS OF PREVIOUS INVESTIGATIONS

Investigator	Date	Race	Place of Birth	Birth Weight (lb.) (Live Births)	
				Mean	S.D.
McKeown and Gibson	1947	European	Birmingham	7.46	1.2
Millis and You Poh Seng	1954	Chinese	Singapore	6.66	1.03
Millis	1959	Indian	Singapore	6.22	1.07
Salber and Bradshaw	1951	European Bantu Coloured Indian	South Africa	7.47 6.77 6.85 6.46	1.14 1.12 1.18 1.15
Le Riche	1938	European	South Africa	7.46	—
Heyns and Hersch	1944	Bantu	Bridgeman Memorial Hospital, Johannesburg	6.74	—
		Bantu	King Edward Hospital, Durban	6.82	—
		Bantu	University Clinic Alexandra, Johannesburg	7.28	—

groups is the same. There were significantly more male stillbirths (66 males, 38 females; $0.025 > P > 0.01$). The stillbirth rate (68.2/1,000 total births) and the twinning rate (25.2/1,000 total births) was much the same among the different ethnic groups and both are higher than in Europe. The twinning rate varies in different parts of Africa but is consistently high (Bulmer, 1960).

The mean birth weights for different parities are given in Table IV, which shows how birth weight increases with parity. Mean birth weights for given parity and age groups of the mother are set out in Table V (overleaf). The numbers are small but there is a definite trend for mean birth weight to increase with parity for a given maternal age. At constant parity maternal age has no clear-cut effect on birth weight except that the very young mothers had lighter babies. This is in agreement with the findings

of Karn and Penrose (1951) for Europeans, although with their larger series mean birth weight decreased slightly with maternal age for a given parity.

TABLE IV
MEAN BIRTH WEIGHTS (ALL BIRTHS) FOR GIVEN PARITY IN ALL GROUPS AND FOR BANTU AND NON-BANTU

Parity	Mean Birth Weight (lb.)					
	All Groups		Bantu		Non-Bantu	
	No.	Mean (lb.)	No.	Mean (lb.)	No.	Mean (lb.)
0	725	6.32	359	6.40	166	6.06
1	516	6.70	424	6.73	92	6.54
2	311	6.76	257	6.84	54	6.41
3	172	6.66	139	6.76	33	6.22
4 and Over	181	7.14	149	7.20	32	6.88

TABLE V
MEAN BIRTH WEIGHT (lb.) FOR ALL BIRTHS FOR
GIVEN PARITY AND AGE GROUP OF MOTHER
Numbers of observations given in parenthesis

Mother's Age Group (yrs)	Parity				
	0	1	2	3	4 and Over
Under 20	6.21 (348)	6.61 (116)	6.12 (27)	5.00 (2)	6.75 (8)
20—	6.32 (221)	6.78 (244)	6.93 (123)	6.36 (48)	6.93 (41)
25—	6.32 (121)	6.71 (119)	6.84 (121)	6.80 (90)	7.09 (60)
30 and Over	6.85 (35)	6.14 (37)	6.57 (40)	6.32 (32)	6.83 (72)

DIFFERENCES BETWEEN BANTU AND NON-BANTU

Table I illustrates the distribution of birth weights for all births among Bantu and non-Bantu and Table VI sets out the means and standard deviations of birth weights for all births, maternal age, and parity for these two groups. As there were only 377 babies from ethnic groups other than Bantu, these were classed together as non-Bantu. The non-Bantu were lighter, having a mean birth weight of 6.36 ± 0.065 lb.) compared with the Bantu whose mean birth weight was 6.62 ± 0.031 lb. This difference is a significant one. The mean maternal age is significantly lower among the non-Bantu but, as mentioned above, this does not affect birth weight. The parity in the two groups is the same and Table IV shows that the mean birth weight increases with parity for both Bantu and non-Bantu. The difference in mean birth weight is therefore not due to differences in parity.

The number of non-Bantu babies was too small for a comparison of the mean birth weight of males and females to be made. The records for the previous year were therefore examined and additional data obtained. These figures are set out in Table VII. The mean birth weights of the Bantu were 6.75 ± 0.04 lb. for males and 6.46 ± 0.042 lb. for females. The

mean birth weights for non-Bantu were 6.56 ± 0.055 lb. for males and 6.19 ± 0.058 lb. for females. The differences are significant for both sexes.

TABLE VII
MEANS AND STANDARD DEVIATIONS FOR BIRTH WEIGHT (ALL BIRTHS) OF (a) BANTU, (b) NON-BANTU, (c) ALL GROUPS, AND DIFFERENCES (a)-(b), BY SEX

Ethnic Group	Sex	Number	Birth Weight (lb.)	
			Mean	S.D.
(a) Bantu	Male	862	6.75 ± 0.040	1.18
	Female	754	6.46 ± 0.042	1.15
(b) Non-Bantu	Male	456	6.56 ± 0.055	1.17
	Female	401	6.19 ± 0.058	1.16
(c) All Groups	Male	1,318	6.69 ± 0.032	1.15
	Female	1,155	6.36 ± 0.035	1.18
Difference (a)-(b)	Male	0.19 ± 0.068 $0.01 > P > 0.005$		
	Female	0.27 ± 0.072 $0.001 > P$		

Why should the non-Bantu babies be lighter than the Bantu at birth? Personal observations showed that the nutritional state of the Nilotic Sudanese and Nilohamitic mothers was equal to or better than that of the Bantu mothers. The Bahutu mothers were not so well nourished and their babies were lighter at birth.

Table VIII (overleaf) shows the means and standard deviations of birth weights for all births of the Bantu, non-Bantu, Bahutu, and non-Bantu excluding Bahutu. It will be seen that the Bahutu have the lowest mean birth weight of 6.26 ± 0.085 lb. However, the non-Bantu from whom Bahutu have been excluded still have a significantly lower birth weight than the Bantu and so the Bahutu alone are not responsible for the difference in mean birth weight between the two groups.

TABLE VI
MEANS AND STANDARD DEVIATIONS OF THREE VARIABLES FOR
(a) BANTU, (b) NON-BANTU, (c) ALL GROUPS, AND THE DIFFERENCES (b)-(a)

Ethnic Group	No.	Birth Weight (lb.) (all births)		Mother's Age (yrs)		Parity	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
(a) Bantu	1,528	6.62 ± 0.031	1.21	23.5 ± 0.133	5.2	1.09 ± 0.045	1.77
(b) Non-Bantu	377	6.36 ± 0.065	1.26	22.6 ± 0.290	5.63	1.19 ± 0.076	1.47
(c) Total	1,905	6.57 ± 0.028	1.21	23.3 ± 0.119	5.19	1.34 ± 0.035	1.55
Differences (b)-(a)	In mean weight (lb.)			In mean age (yrs)		In Parity	
	-0.26 ± 0.072 $0.001 > P$			-0.92 ± 0.319 $0.005 > P > 0.001$		$+0.1 \pm 0.088$ $0.4 > P > 0.2$	

TABLE VIII

MEANS AND STANDARD DEVIATIONS FOR BIRTH WEIGHT (ALL BIRTHS) OF (a) BANTU, (b) NON-BANTU, (c) BAHUTU, (d) NON-BANTU EXCLUDING BAHUTU, AND DIFFERENCES (d)-(c), (a)-(d), AND (a)-(b)

Ethnic Group	No.	Birth Weight (lb.)	
		Mean	S.D.
(a) Bantu	1,528	6.62 ± 0.031	1.21
(b) Non-Bantu	837	6.39 ± 0.040	1.15
(c) Bahutu	202	6.26 ± 0.085	1.21
(d) Non-Bantu excluding Bahutu	635	6.43 ± 0.045	1.13
Differences	(d)-(c)	0.17 ± 0.095 0.1 > P > 0.05	
	(a)-(d)	0.19 ± 0.058 0.001 > P	
	(a)-(b)	0.23 ± 0.051 0.001 > P	

Roberts (1960) discussed the effects of race and climate on human growth by reference to his studies on African children. He pointed out that the weight per unit stature of African children is less than that of European children. This low weight per unit height reaches its extreme in children of the tall long-limbed short-trunked Nilotics and is not due to under-nutrition. The low mean weight of the African children is related to mean annual temperature and this association is not due to stature differences. A high proportion of the total variance in mean weight is attributable to variation in climate and stature in combination. This empirical association is unexplained, but it is possible that genetic adaptation plays a part and perhaps the African children where birth weight is lowest will have the smallest weight per unit stature. There is clearly a need for detailed studies of the growth of African children from birth onwards and for an evaluation of both the genetic effect and that of the process of growth.

SUMMARY

Data from 2,068 consecutive African births are presented. The babies were all born on the Maternity Wards of Mulago Hospital, Kampala, Uganda. The effect on birth weight of maternal age, parity, and ethnic group are discussed. The mean birth weight is 6.57 ± 0.028 lb. and the Bantu in this series are heavier than the non-Bantu.

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