

The Central African Journal of Medicine

Volume 7

AUGUST, 1961

No. 8

The Incidence and Effects of Prematurity among Non-Africans in Ndola, Northern Rhodesia

BY

J. A. LEITCH, M.B., CH.B., D.C.H., D.P.H.
*Formerly Medical Officer of Health,
Municipality of Ndola.*

INTRODUCTION

In view of the importance of prematurity as a cause or factor in infant mortality, it was considered justifiable to carry out a small enquiry into the incidence of prematurity among non-African races in Ndola. The enquiry could not be extended to Africans owing to the lack of adequate hospital records for this section of the community.

THE BACKGROUND TO THE SURVEY

With very few exceptions indeed, non-African women resident in Ndola have their babies in the local hospital, making use of the same wards and facilities. All babies immediately after birth are weighed naked on the same counter-type scale, being laid on a napkin the weight of which is deducted to arrive at the birth weight of the child. The same scale was in use throughout 1957-59.

By arrangement, the Municipal Health Department is notified of all non-African births by the hospital authorities. The notification gives details of the birth weight to the nearest

half ounce, but unfortunately the parity of the mother is not stated.

THE SCOPE OF THE SURVEY

The survey attempted to cover all births to non-African residents of Ndola during the years 1957-59.

The number of babies included in the survey is given in Table I. The number of births registered, corrected for outward transfers only, is shown in italics.

Illegitimate births occur rarely among the Asiatic* community, but the low incidence of illegitimate births among the European community (1.56 per cent.) suggests that unmarried European mothers-to-be may be leaving the municipality to have their children elsewhere. Among the Coloureds,† 17.8 per cent. of the births were illegitimate.

All multiple births registered were included in the survey.

From this table it will be seen that not every birth registered has been included in the survey; at the same time, certain births to non-residents have been included. There is no reason, how-

* The term Asiatic is used locally to include persons originating from the Indian sub-continent. It does not include persons originating from other parts of Asia who would strictly be entitled to be referred to as Asiatics.

† Throughout this article the word Coloured is used to include all persons of mixed race.

Table I
BIRTHS INCLUDED IN SURVEY AND BIRTHS REGISTERED

	EUROPEAN			ASIATIC			COLOURED		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1957	103 (111)	122 (142)	225 (253)	37 (47)	31 (36)	68 (83)	8 (9)	5 (9)	13 (18)
1958	126 (135)	129 (130)	255 (265)	48 (50)	57 (57)	105 (107)	13 (14)	13 (12)	26 (26)
1959	131 (136)	124 (116)	255 (252)	46 (44)	43 (44)	89 (88)	22 (21)	10 (8)	32 (29)
TOTAL	360 (382)	375 (388)	735 (770)	131 (141)	131 (137)	262 (278)	43 (44)	28 (29)	71 (73)

Multiple births 12

2

13

Illegitimate births registered 9

2

—

ever, to believe that any special selection has operated in respect of such births.

THE BIRTH WEIGHT

The frequency distribution of the birth weights is given in Tables II and III.

In Table II comparative figures from Stan-

dards of Normal Weight in Infancy (Ministry of Health, 1959a) are shown against the figures for Europeans.

From the figures given in Table III it is clear that the birth weights of Europeans in Ndola tend to be lower than those given in the above-mentioned publication.

Table II
FREQUENCY DISTRIBUTION OF BIRTH WEIGHTS

	EUROPEAN			ASIATIC			COLOURED		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Under 3 lb.	—	1	1	—	2	2	—	—	—
3 lb.	4	1	5	2	1	3	—	—	—
4 lb.	7	9	16	10	14	24	1	—	1
5 lb.	28	39	67	48	47	95	3	4	7
6 lb.	87	113	200	53	56	109	14	13	27
7 lb.	138	137	275	17	10	27	14	6	20
8 lb.	79	61	140	—	1	1	8	4	12
9 lb.	17	13	30	1	—	1	2	—	2
10 lb.	—	1	1	—	—	—	1	1	2
TOTAL	360	375	735	131	131	262	43	28	71

Table III
PERCENTAGE DISTRIBUTION OF BIRTH WEIGHTS

	EUROPEAN						ASIATIC			COLOURED		
	Male		Female		Total	Male	Female	Total	Male	Female	Total	
	This Series %	English Series %	This Series %	English Series %								
Under 3 lb.	— }	.2	.3 }	.3	.1	—	1.5	.8	—	—	—	
3 lb.	1.1	.2	.3	.3	.7	1.5	.8	1.1	—	—	—	
4 lb.	1.9	1.1	2.4	1.7	2.2	7.6	10.7	9.2	2.3	—	1.4	
5 lb.	7.8	6.2	10.6	8.6	9.2	36.6	35.9	36.3	7.0	14.3	9.9	
6 lb.	24.2	21.2	30.1	28.7	27.3	40.5	42.8	41.6	32.6	46.4	38.0	
7 lb.	38.3	35.9	36.5	36.2	37.4	13.0	7.6	10.3	32.6	21.4	28.2	
8 lb.	21.9	25.0	16.3	18.3	19.1	—	.8	.4	18.6	14.3	16.9	
9 lb.	4.7	8.3	3.5	5.2	4.1	.8	—	.4	4.6	—	2.8	
10 lb.	—	2.1	.3	1.0	.1	—	—	—	2.3	3.6	2.8	
TOTAL	99.9	100.0	100.3	100.0	99.7	100.0	100.1	100.1	100.0	100.0	100.0	

The birth weight of Coloureds approximates to that of Europeans rather than of Asiatics; the birth weight of Asiatics is lower than that of either Europeans or Coloureds.

THE MEAN BIRTH WEIGHTS

The mean birth weights and their standard deviations are given in Table IV.

It will be noted that in every instance except for Europeans in 1957 and Coloureds in 1959, the mean birth weight of male babies is greater than that of females.

Among Europeans the difference between the mean birth weights of the sexes is not significant in 1957 or 1958, but is significant in 1959 ($t^2 = 7.18$) and for the whole series ($t^2 = 5.61$).

Among Asiatics the difference between the mean birth weights of the sexes is not significant in any individual year, and for the whole series is only significant at the 90 per cent. level ($t^2 = 3.44$).

Among Coloureds the differences are not significant.

When comparing the differences between the mean birth weights of the races throughout the whole series, there is no significance in any difference observed between the means for Europeans and Coloureds; between the means for Asiatics and other races, however, the differences are highly significant, t^2 varying from 28.8 to 247.9.

INCIDENCE OF PREMATURITY

From the figures given in Table III one would expect to find the incidence of prematurity to be highest among the Asiatics, and this is in fact the case, as is shown in Table V.

(Premature births are those where the birth weight is $5\frac{1}{2}$ lb. or less.)

In comparing the incidence of prematurity between the sexes, only among Asiatics is the observed difference greater than twice the standard error of the difference, i.e., the observed difference is significant.

In comparing the incidence of prematurity between races, the observed difference is significant when the figures for Asiatics are compared with those of other races.

Table IV
MEAN BIRTH WEIGHTS

	EUROPEAN					
	Male		Female		Total	
	Mean lb.	Standard Deviation lb.	Mean lb.	Standard Deviation lb.	Mean lb.	Standard Deviation lb.
1957	7.207	1.196	7.232	1.003	7.220	1.103
1958	7.285	1.140	7.082	1.097	7.182	1.123
1959	7.381	1.062	7.009	1.153	7.201	1.117
TOTAL	7.297	1.130	7.106	1.095	7.200	1.113
ASIATIC						
1957	5.944	.723	5.653	1.038	5.812	.886
1958	6.172	.936	5.971	.870	6.063	.886
1959	6.162	.854	5.999	.822	6.083	.838
TOTAL	6.104	.851	5.905	.889	6.005	.874
COLOURED						
1957	7.578	1.913	6.931	2.245	7.329	1.981
1958	7.161	.551	6.803	.966	6.981	.792
1959	7.227	1.112	7.341	1.512	7.263	1.223
TOTAL	7.273	1.156	7.018	1.406	7.172	1.257

Table V
INCIDENCE OF PREMATURE BIRTHS

	EUROPEAN								
	Male			Female			Total		
	Total Births	Premature Births		Total Births	Premature Births		Total Births	Premature Births	
		Number	%		Number	%		Number	%
1957	103	9	8.74	122	7	5.74	225	16	7.11
1958	127*	7	5.51	129	7	5.43	256*	14	5.47
1959	131	4	3.05	124	15	12.10	255	19	7.45
TOTAL	361*	20	5.57	375	29	7.73	736*	49	6.66
ASIATIC									
1957	37	8	21.63	31	12	38.71	68	20	29.41
1958	48	11	22.92	57	21	36.85	105	32	30.47
1959	46	10	21.74	43	12	27.91	89	22	24.72
TOTAL	131	29	22.14	131	45	34.35	262	74	28.24
COLOURED									
1957	8	1	12.5	5	—	—	13	1	7.69
1958	13	—	—	13	1	7.69	26	1	3.85
1959	22	1	4.55	10	—	—	32	1	3.13
TOTAL	43	2	4.65	28	1	3.57	71	3	4.25

* Includes one child whose birth weight was not given as "too premature to weigh."

THE EFFECTS OF PREMATURITY

A high incidence of prematurity among any particular group would suggest that such a group would have a high neonatal mortality. In this series this is not the case. The infant mortality rates for the various racial groups for 1957-59 are given in Table VI and none of the differences in rates is significant.

Vital statistics have been kept since the beginning of 1955, and the rates for 1955-59 are also given in Table VI. For this period the only significant difference is between the post-neonatal mortality rates of Europeans and Asiatics.

DISCUSSION

Among Europeans the incidence of prematurity (6.66 per cent.) compares reasonably with most other surveys outside this territory, e.g., 4.2 per cent. in Natal (Salber and Bradshaw, 1951); 5.9 per cent. in Southern Rhodesia for singleton hospital births only (Houghton and Ross, 1953); 4.98 per cent. in Scotland (Douglas and McKinlay, 1959); 6.5 per cent. in England

and Wales (Grundy and Lewis-Faning, 1957); 5 per cent. in England and Wales (Ministry of Health, 1959b); 6.9 per cent. in England and Wales (Ministry of Health, 1956).

Among Coloureds the incidence of 4.2 per cent. compares favourably with the incidence among Europeans and with the figures for Coloureds of 9.6 per cent. found by Salber and Bradshaw (1951) and 13.3 per cent. by McDonald (1956). In the present series, however, the numbers are too small for any firm conclusions to be drawn.

Among Asiatics the incidence of 28.24 per cent. is extremely high—far higher than the figure of 18.3 per cent. found by Salber and Bradshaw (1951).

No scientific surveys have been carried out locally on the differences between the races which may have a bearing on the incidence of prematurity, but the impressions are:

- (a) The per capita income of Asiatics is somewhat lower than that of the Euro-

Table VI
INFANT DEATH RATES

1957/1959	European	Asiatic	Coloured
Infant mortality rate	25.97	50.36	Nil
Neonatal mortality rate	18.18	17.99	Nil
Post-neonatal mortality rate	7.79	32.37	Nil
Stillbirth rate	15.34	31.36	13.51
Perinatal mortality rate	31.97	45.30	13.51
<hr/>			
1955/1959			
Infant mortality rate	29.23	48.54	Nil
Neonatal mortality rate	23.21	21.85	Nil
Post-neonatal mortality rate	6.02	26.69	Nil
Stillbirth rate	14.41	21.37	8.62
Perinatal mortality rate	36.44	38.01	8.62

peans but appreciably higher than that of the Coloureds.

- (b) The housing standards of the Europeans are good and those of the Asiatics vary between good and poor; for the majority, the housing standards are equal to those of the European, but for about 10 per cent. of the members of the community they are inferior. The housing standards for the Coloureds are generally adequate and satisfactory, but of a lower quality than those of the Europeans and Asiatics.
- (c) The average parity of the Asiatic is approximately the same as that of the Coloured, but higher than that of the European.
- (d) About two-thirds of the Asiatics are Hindus and one-third Moslems. The women adhere strongly to the precepts of their religions, and for this reason the intake of animal protein, particularly by the women, is low.

The report on the Second Session of the Joint FAO/WHO Expert Committee on Nutrition (1951) states that comparison of birth weights, premature birth rates and stillbirth rates between different groups are the types of data

that can be used to assess nutritional status, but that nutritional status is not the only factor governing any of the indices mentioned above. Similarly, the study group of the World Health Organisation on the measurement of the levels of health (1957) referring to differences in birth weight have concluded "the fact should not be overlooked that there are ethnic factors as well as factors relating to the size of the mother and the parity." Jelliffe (1955, 1958), while stressing the important effects of maternal malnutrition on the birth weight of the child, recognises that racial factors and the size of the mother may have a bearing on the birth weight of the child.

In England and Wales, where the incidence of prematurity in any recent survey has not exceeded 7 per cent. in the years 1955-58, over 50 per cent. of the death certificates in respect of neonatal deaths each year made mention of prematurity and less than 2 per cent. in respect of post-neonatal deaths (Registrar General, 1956, 1957, 1958, 1960).

Unfortunately this municipal health department does not receive actual death certificates or a complete copy thereof in respect of deaths occurring within the municipal area. It is not possible, therefore, to ascertain the number of occasions upon which the death certificate makes mention of prematurity.

It is safe to assume that if the incidence of prematurity in England and Wales were to rise to the figure approximating to that of the Asiatic community in this series, then there would be a vast increase in the number of neonatal deaths and in the neonatal mortality rate. The neonatal rate for Asiatics in this series is not significantly different from that for the Europeans, and the rate of 17.99 for the period 1957-59 compares not unfavourably with the figure of 16.5 for England and Wales during 1957 (Registrar General, 1959). These facts would indicate that prematurity as judged by the present generally accepted standard is not of such great importance among Asiatics as a cause of neonatal death.

This fact has been borne out in other surveys. Lumsden (1954) reviewed a group of non-paying hospital patients in Singapore and found that the Indians with a prematurity incidence of 19 per cent. had a neonatal death rate of only 8.5 per cent. among the prematures, whereas the Chinese with a prematurity incidence of 10.8 per cent. had a neonatal death rate of 17.4 per cent. among the prematures.

Verhoestraete and Puffer (1958) compare the effects of prematurity among infants in Calcutta and in the United States of America. Their figures are summarised in Table VII.

Table VII

COMPARISON OF PREMATURITY INCIDENCE AND
NEONATAL DEATHS IN CALCUTTA AND THE
UNITED STATES OF AMERICA
(Verhoestraete and Puffer, 1958)

	Incidence of Prematurity	Percentage of Premature Infants Dying Under the Age of One Week
	%	
Calcutta	35	9.1
U.S. non-whites	10	14.2
U.S. whites	7	16.2

The post-neonatal death rate for Europeans compares well with the figure of 6.7 for England and Wales in 1957 (Registrar General, 1959). It is difficult, however, to attribute the higher post-neonatal death rate among Asiatics to the higher incidence of prematurity, particularly when the neonatal death rate approximates so closely to that of the Europeans. It is probable that this higher post-neonatal mortality rate can be attributed to environmental factors, as in other parts of the world.

On the evidence submitted it is considered that there are grounds for accepting the view that the effects of prematurity as at present defined among Asiatics are not of such importance as among Europeans.

SUMMARY

(1) Among the non-African racial groups in Ndola the mean birth weight is higher and the incidence of prematurity lower among Coloureds and Europeans than among Asiatics.

(2) The neonatal death rates were not higher among Asiatics, in spite of a higher incidence of prematurity.

REFERENCES

- DOUGLAS, C. A. & MCKINLAY, P. L. (1959). *Hlth. Bull. CMO Dept. Hlth. Scot.*, 17, 39.
 GRUNDY, F. & LEWIS-FANING, E. (1957). *Morbidity and Mortality in the First Year of Life*, p. 97. The Eugenics Society, London.
 HOUGHTON, J. W. & ROSS, W. F. (1953). *Trans. Roy. Soc. trop. Med. Hyg.*, 47, 62.
 JELLIFFE, D. B. (1955). *Infant Nutrition in the subtropics and tropics*. W.H.O. Monograph Series No. 29, p. 71. Geneva.

- Ibid.* (1958) in *Diseases of Children in the subtropics and tropics*, p. 94. Ed., Trowell, H. C. & Jelliffe, D. B. Edward Arnold, London.
 LUMSDEN, J. W. F. (1954). *Proc. Alumni Ass. Malaya*, 7, 195. Reviewed in *Bull. Hyg.* (1955), 30, 203.
 McDONALD, R. (1956). *S. Afr. med. J.*, 30, 1035.
 MINISTRY OF HEALTH (1956). *Annual Report of the Chief Medical Officer for the year 1955*, p. 94. H.M.S.O., London.
 MINISTRY OF HEALTH (1959a). *Standards of Normal Weight in Infancy*. Rep. pub. Hlth. med. Sub. No. 99, p. 20. H.M.S.O., London.
 MINISTRY OF HEALTH (1959b) *Ibid.*, p. 10.
 REGISTRAR GENERAL (1956). *Statistical Review of England and Wales*, 1955, Part I, Table 27.
 REGISTRAR GENERAL (1957). *Ibid.*, 1956.
 REGISTRAR GENERAL (1958). *Ibid.*, 1957.
 REGISTRAR GENERAL (1960). *Ibid.*, 1958.
 REGISTRAR GENERAL (1959). *Statistical Review of England and Wales*, 1957, Part III, p. 77.
 SALIBER, E. J. & BRADSHAW, E. S. (1951). *Brit. J. Soc. Med.*, 5, 113.
 VERHOESTRAETE, L. J. & PUFFER, R. R. (1958). *J. Amer. med. Ass.*, 167, 950.
 WORLD HEALTH ORGANISATION (1951). *Joint FAO/WHO Expert Committee on Nutrition*. Report on the Second Session, *Wld. Hlth. Org. techn. Rep. Ser.*, 44, 47.
 WORLD HEALTH ORGANISATION (1957). *Measurement of Levels of Health*. Report of a Study Group. *Wld. Hlth. Org. techn. Rep. Ser.*, 137, 16.