The impact of urbanisation on the health of black pre-school children in the Umtata district, Transkei, 1990

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Summary

The impact of rapid urbanisation on some aspects of child health in Transkei was assessed. The study area comprised clusters from urban, peri-urban and rural areas, giving a sample size of 1 080 children. Information collected included anthropometric measurements (weight and height), immunisation status, family socio-economic status, and practices regarding preventive health. The child's place of birth, maternal education and paternal support were also assessed.

In the sample, 20,6% of children were born at home. Diarrhoea prevalence ranged from 18,3% in urban to 24,9% in peri-urban areas; 70,2% of mothers/carers knew about oral rehydration therapy and 56,3% had used it to treat diarrhoea, only 2,5% knew how to prepare the solution properly. Breast-feeding was practised early in life but by 1 year 74,6% of mothers had stopped; 54,9% started supplementary feeds by 1 month of age and by 4 months 89,6% of all children were on supplementary feeds. Of the children, 9,5% were underweight, 25,5% were stunted and 3,8% had acute protein energy malnutrition (wasting). Monthly per capita food expenditure was used to assess socio-economic status and 50% of all children came from homes spending R21,00 per person on food per month.

Reasons for poor child health were examined and recommendations are made for promoting child health in the face of rapid urbanisation.

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Transkei covers an area of 45 000 km² with an estimated population of 3 million (1985 sample census) of which pre-school children contribute 15 - 17%. The majority of people live in rural areas, while 5% are fully urbanised. Over the past 10 years, however, the rapid rate of urbanisation (to Umtata and to a lesser extent to Butterworth) has created a rapidly expanding peri-urban fringe, which may account for 5 - 10% of the total population. This peri-urban zone is inhabited mainly by rural-urban migrants seeking employment in cities but who cannot afford the high city rentals. Housing and many social and environmental amenities are generally poor. Overcrowding and poverty are in some cases even worse in these peri-urban fringes than in rural areas.

In the rural areas, the majority of Transkeians are poor subsistence farmers who depend on monthly remittances from relatives working either in the Transkeian towns or in South Africa. The rapid rate of urbanisation has changed rural life-styles from traditional agricultural to cash economies and has also affected the demographic structure of the population in rural areas. High migration rates of young people to towns have resulted in women and children being left to cater for old people.

Many preventable diseases, especially tetanus, infantile gastro-enteritis and measles, still account for the high infant mortality rate.[1] Information about nutritional status is limited.[2]

The overall aim of this study was to determine the impact of urbanisation on the health status of pre-school children. UNICEF's growth monitoring, oral rehydration, breast-feeding and immunisation and female education, family planning and food supplementation (GOBI-FFF) child survival approach served as the basis for the study.

Subjects and methods

Study area and cluster sampling

To meet the requirements of a comparative study, the districts were divided into three zones; urban, peri-urban and rural.[3]

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The following definitions were used to demarcate zones: (*i*) urban — an area so classified by the municipal authorities; (*ii*) peri-urban — those locations or townships lying within 5 - 10 km of the town centre whether classified peri-urban by the local municipality or not; and (*iii*) rural — all locations/settlements lying further than 10 km from the town centre, and not within municipal boundaries.

On-ground site surveys determined the total number of houses in each area and from these clusters were proportionally demarcated according to the estimated number of houses or shacks. This was crucial because even where aerial photographs and maps did exist, they did not show all the shack or tent dwellings and missed out families staying in garages.

From the above sampling frame, a total of 90 clusters was selected by single random sampling (30 clusters per zone). In each cluster, 12 children were selected and included if they were under 5 years old, were *de facto* residents of the household, and had a mother or mature carer to act as a respondent to the questionnaire. The starting household for each cluster was randomly selected using the standard World Health Organisation procedure.[4] The most exclusive residential suburbs in the urban area were not included in the study. It was felt that these areas had the lowest risk for disease and adequate access to health services.

Procedure

Three groups of Xhosa-speaking trained assistants supervised by a senior nurse and a doctor carried out the survey. The team interviewed the mothers/carers using an extensively piloted questionnaire and obtained anthropometric measurements.

Anthropometric measurements

All subjects were weighed with minimum clothing (underwear and no shoes) using Salter hanging scales for children aged 0 - 2 years and bathroom scales for older children. Daily correction adjustments and checks on the scales used were made to ensure the correctness of calibrations and systematic accuracy.

Inter- and intra-observer variation between different assistants was assessed by taking duplicate measurements for standardisation purposes.

Somatometers were used to measure height for infants, while modified measuring rods (straight rods with tape measure attached) were used for taking heights of older children. For older children, heights were taken while standing erect against a vertical wall with heels and occiput touching the wall. Heights were taken to the nearest millimetre.

Age was obtained from 'Road-to-Health' cards (RTHC) and where these were not available, other sources such as birth/baptism certificates were used. Where none of these was available, major historical events were used to help the mother/carer's memory in identifying the child's age.

The immunisation coverage for all children was analysed from RHTCs. For purposes of estimating the vaccination coverage, however, only results of children aged 12 - 23 months are presented.

Data analysis

The US National Centers for Health Statistics (NCHS/WHO)[5] charts for anthropometric data were used for reference purposes. Classification of anthropometric indicators of malnutrition was done according to cut-off points recommended by Waterlow.[6]

Estimation of a family's socio-economic status was done using the monthly per capita food expenditure index (MPCFE), which in this case was the amount of money spent on food per month divided by the total number of people in the household. Although this measure fails to accommodate the needs of children compared with adults, it nevertheless throws some light on the socio-economic status of the families from which the subjects were recruited.

Regarding the evaluation of some GOBI factors, the following definitions were used: (*i*) diarrhoea was taken to mean a history of $\geqslant 2$ loose stools during the past 2 weeks; and (*ii*) the mother/carer's knowledge of preparation of the sugar salt solution was estimated using the Transkei standard composition (1 litre water + 8 teaspoons sugar + 1 teaspoon salt).

Results

Information on 1 080 children was obtained.

Demographic characteristics of the study population

Table I shows the age distribution in the three areas. There is a gradual drop-out in the percentages of children by age in all three areas. This might be attributed to infant/child mortality. The gender distribution was similar in all areas. The

TABLE I. PERCENTAGE AGE DISTRIBUTION OF STUDY POPULATION BY ZONE

Age (mo.)	Urban ($N = 360$)	Peri-urban ($N = 360$)	Rural ($N = 360$)
< 12	28,8	26,2	28,3
12-23	25,2	23,9	18,1
24-35	16,1	20,1	21,4
36-47	16,6	15,6	18,6
48+	13,3	14,2	13,6
Total	100,0	100,0	100,0

TABLE II. SUMMARY OF SOCIODEMOGRAPHIC VARIABLES (%) BY REGION

Variables	Urban ($N = 360$)	Peri-urban ($N = 360$)	Rural ($N = 360$)
Home birth*	3,9	25,1	32,8
Usual child carer*			
Mother	28,8	57,1	75,1
Grandmother	4,4	22,8	17,8
Maid	57,3	12,5	2,8
Married (mother)	66,5	59,3	65,0
Employed (mother)*	72,0	5,4	21,0
Father supports child	77,5	70.8	73,0
Living with family*	64,5	47,9	32,5
Educational status of mother (yrs schooling)**			
Median	10	6	5
Interquartile range	2	3	3
MPCFE (Rs)***			
Median	33,3	18,7	16,7
Interquartile range	26,6	15,2	13,9

test comparing three regions:
* $P < 0,0001$.
** Kruskal-Wallis: $\chi^2 = 332,1$; 2 df; $P = 0,0001$.
*** Kruskal-Wallis: $\chi^2 = 194,2$; 2 df; $P = 0,0001$.

percentage of home deliveries in rural areas was significantly higher than in other areas (Table II). While significantly more children were looked after by their mothers in both the peri-urban and rural areas compared with urban area, a greater percentage of mothers in urban areas were employed than in other areas. The educational status of mothers in urban areas was higher than that of rural mothers and the MPCFE was lower in rural areas than in peri-urban or urban areas (Table II).

Diarrhoea, oral rehydration solution use and water availability

Diarrhoea rates were highest in the peri-urban fringes. While a good proportion of mothers/carers admitted to having used the oral rehydration solution to treat diarrhoea, especially those from peri-urban and rural areas, hardly any of them could constitute the solution properly (Table III). Only 2,5% of all mothers knew how to prepare the solution.

TABLE III. DIARRHOEA, ORS PREPARATION AND MAJOR WATER SOURCE

Variable	Urban (%)	Peri-urban (%)	Rural (%)
Child had diarrhoea in past 2 weeks*	**18,3**	**24,9**	**19,2**
Water Source**			
In the home (tap)	**98,6**	**20,3**	**1,4**
Community tap	**0,6**	**38,7**	**45,8**
Spring/river	**0,8**	**59,0**	**43,9**
Other	**—**	**—**	**8,9**
Mother's/carer's ORS knowledge***	**65,1**	**68,1**	**77,2**
ORS ever used to treat diarrhoea****	**46,0**	**55,6**	**67,2**
ORS — actual knowledge of preparation	**3,3**	**2,2**	**1,9**

* $\chi^2 = 5,6$; 2 df; $P = 0,062$.
** $\chi^2 = 838,3$; 10 df; $P < 0,0001$.
*** $\chi^2 = 15,2$; 4 df; $P = 0,004$.
**** $\chi^2 = 33,2$; 2 df; $P > 0,0001$.
ORS = oral rehydration solution.

The availability of safe/clean potable water for human consumption was higher in urban areas followed by peri-urban areas and then rural areas.

The association between diarrhoea and the availability of a clean water source was statistically significant ($\chi^2 = 13,1$; df = 5; $P = 0,022$) indicating a close relationship between the prevalence of diarrhoea and the water source.

Breast-feeding

While most mothers started breast-feeding, supplementary feeding was started earlier by urban and peri-urban mothers than by rural mothers (Table IV).

Anthropometric measurements

Wasting was present in all areas, but no statistical difference was observed between areas. Stunting, however, was more than twice as common in rural areas compared with urban zones. Acute protein energy malnutrition (PEM) (wasting) was rare in all zones (Table V).

TABLE IV. BREAST-FEEDING PRACTICES AND SUPPLEMENTARY FEEDS

Indicator	Urban ($N = 360$)	Peri-urban ($N = 360$)	Rural ($N = 360$)
Child ever breast-fed (%)	**89,8**	**91,4**	**91,9**
% mothers stopping breast-feeding by 1 yr*	**85,3**	**75,8**	**62,6**
% mothers starting supplementary feeds by 1 mo.**	**64,5**	**54,9**	**51,1**
% mothers starting supplementary feeds by 4 mo.	**94,2**	**88,5**	**91,4**

* $\chi^2 = 48,7$; 2 df; $P < 0,0001$.
** $\chi^2 = 4,4$; 2 df; $P = 0,11$.

TABLE V. PERCENTAGE BELOW 3RD PERCENTILE DISTRIBUTION BY ZONE

Indicator	Urban ($N = 360$)	Peri-urban ($N = 360$)	Rural ($N = 360$)
Weight for age (underweight)	**8,1 (5,3 - 10,9)**	**10,3 (7,3 - 13,3)**	**10,0 (7,0 - 13,0)**
Height for age (Stunting)	**13,6 (10,0 - 17,2)**	**28,9 (24,2 - 33,6)**	**33,8 (28,9 - 3,3)**
Weight for height (wasting)	**3,9 (2,0 - 5,8)**	**5,0 (2,7 - 7,3)**	**1,9 (0,5 - 3,3)**

95% confidence intervals in parentheses.

Immunisation coverage

There was no statistical difference in the availability of RTHCs in the three zones (Table VI). A higher proportion of children in the peri-urban area reported a history of measles than in other areas.

TABLE VI. PERCENTAGE DISTRIBUTION OF RTHC AND HISTORY OF MEASLES IN CHILDREN AGED 12 - 23 MONTHS BY ZONE

Variable	Urban ($N = 91$)	Peri-urban ($N = 86$)	Rural ($N = 65$)
RTHC seen	**80,2 (72 - 88,4)**	**83,7 (76 - 91,4)**	**73,9 (63,3 - 84,5)**
RTHC not seen	**7,7 (2,2 - 13,2)**	**7 (1,6 - 12,4)**	**3,1 (0 - 7,2)**
Had had measles	**8,8 (3 - 14,6)**	**16,3 (8,6 - 24)**	**4,6 (0 - 9,6)**

95% confidence intervals in parentheses.

Immunisation coverage was lowest for all vaccines in the rural areas (Table VII), with peri-urban coverage rates being intermediate.

Discussion

Two methodological problems were encountered during the study.

TABLE VII. PERCENTAGE REGIONAL DISTRIBUTION OF IMMUNISATIONS IN CHILDREN AGED 12 - 23 MONTHS

Vaccination	Urban (*N* = 91)	Peri-urban (*N* = 86)	Rural (*N* = 65)
BCG	80,2 (72 - 88,4)	79,1 (70,5 - 87,7)	73,9 (63,3 - 84,5)
DPT 1	80,2 (72 - 88,4)	81,4 (72,8 - 89,7)	72,3 (61,4 - 83,2)
DPT 2	79,1 (70,7 - 87,5)	75,6 (66,6 - 84,6)	70,8 (59,8 - 81,8)
DPT 3	76,9 (68,2 - 85,6)	68,6 (58,8 - 78,4)	69,2 58,0 - 80,4)
Polio 1	80,2 (72 - 88,4)	80,2 (71,7 - 88,7)	72,3 (61,4 - 83,2)
Polio 2	78,0 (69,5 - 86,5)	73,3 (63,9 - 74,0)	67,7 (56,4 - 79,0)
Polio 3	75,8 (67,1 - 84,5)	63,9 (53,8 - 74,0)	63,1 (51,4 - 74,8)
Measles 1	69,2 (59,7 - 78,7)	70,9 (61,3 - 80,5)	60,0 (48,1 - 71,9)

95% confidence intervals in parentheses.

1. Study area demarcation: the major obstacle was the classification of which areas were urban, peri-urban and rural. As has previously been described,[3] rapid urbanisation results in urban, peri-urban and rural boundaries are becoming blurred. For this reason a practical classification scheme was used, which applies to Umtata and may not be applicable to other urban areas.

2. The estimation of MPCFE was difficult, particularly in rural and peri-urban areas where daily rations are bought depending on the availability of money. Mothers did not feel comfortable discussing their economic problems. It was while trying to elicit information regarding socio-economic status that the researchers realised the extreme degree of dependency in rural areas on income from migrant labourers. Sometimes non-arrival of remittances might mean starvation for a family. Most young able-bodied men had left the rural areas and although many mothers were married, they never lived with their husbands who migrated in search of work (Table II).

The advantages and disadvantages of urbanisation on child health are summarised in Table VIII. Although oversimplified, the indicators could act as catalysts for action aimed at improving child health in the face of rapid urbanisation.

The high percentage of home deliveries in rural areas (a rate that has not changed much since a 1982 study[1]) may be a reflection of the poor availability and accessibility of services in rural areas. Since some mothers in rural areas use traditional birth attendants, it would be strategic to address their training more seriously.

TABLE VIII. ADVANTAGES/DISADVANTAGES OF URBANISATION ON CHILD HEALTH BY REGION FOR UMTATA, TRANSKEI

Indicator	Urban	Peri-urban	Rural
Income (MPCFE)	+ + +	+	—
Diarrhoea	+	+ + +	+ +
ORS*	—	—	—
Clean water source	+ + +	+ +	—
Breast-feeding	—	+/—	+ + +
Nutritional status	+	—	—
Immunisations	+ +	+ + +	—
Education	+ + +	+ +	—

* Knowledge of how to prepare a sugar-salt solution.

Regarding child care, this survey demonstrated a new trend where a maid had become a foster 'mother' in urban areas. Because of the mother's employment and changing work patterns, there appears to be a shift from maternal care in towns to maid-care. This is likely to have profound implications on aspects of child care such as breast-feeding and even the baby-mother bonding relationship.

Maternal employment is closely related to maternal education and urban mothers enjoy more working facilities and have better educational levels than their rural counterparts. It was thus common to find a rural child living with a grandmother when the mother was educated and working in town.

The families' socio-economic status, as indicated by the MPCFE, was generally poor. The majority of families survived on very little money for food (median R25 per month) with more poverty in peri-urban areas, while the worst conditions were found in rural areas. Since this study was conducted in the Umtata district, which is the capital and economic nerve centre of Transkei, the situation is not likely to be any better in remote poorer districts of the country. ('Urban' Umtata figures are an underestimate of the socio-economic status, since the wealthiest suburbs were excluded.)

The impact of diarrhoeal disease on morbidity and mortality in pre-school children is well documented to be a major problem in this subcontinent.[7-9] While most mothers/carers knew about the use of ORS (oral rehydration solution), and claimed to have used it to treat diarrhoea, hardly any of them knew the proper method of constituting it. However, commercially prepared ORS sachets are distributed by the clinics, which, to some extent, obviates the need for this knowledge in areas close to clinics.

In the Hewu district of neighbouring Ciskei, the use of village health workers in teaching mothers how to safely prepare the sugar-salt solution[10] met with success, and this indicates the potential of village health workers to play a key role in reducing diarrhoea mortality. Village health workers improve understanding of the GOBI-FFF programme and also its acceptability in the community.[11]

The close association between a clean water source and diarrhoea shown in this study indicates that rural water distribution schemes, as part of development, are essential. Many rural people have no access to clean water and have to depend on unprotected springs, wells and rivers where the dirty water is shared with their animals.

The changing patterns of employment with urbanisation have disrupted family life in general and child care in particular. The impression of research in that most employment agencies strongly resent pregnant mothers and mother lose their jobs when they fall pregnant. There is no maternity leave in most workplaces and with the job as the only source of income, mothers return to work during the puerperium. Working hours do not allow breast-feeding breaks and the only chance to breast-feed is therefore at night and then only for mothers who stay with their babies in towns and peri-urban areas.

Most working mothers probably breast-feed for a short time, start the baby on supplementary feeds and then send it home to the rural area to stay with an aunt or grandmother. Rural mothers, on the other hand, breast-feed for longer. Although most mothers can hardly buy food for the family (median MPCFE = R16,70), 51,1% of all children in rural areas had been started on supplementary feeds by 1 month of age and 91,4% by the age of 4 months. Most of this supplementation is overdiluted formula feeds. With poor water source and the use of the feeding bottle still in practice, diarrhoea and associated malnutrition will inevitably occur.

The use of simple anthropometric measurements to assess the nutritional status of a community is a practical, cost-effective technique, especially in developing countries.[12] Few studies have systematically examined the relationship between

levels of urbanisation and nutritional status. This is crucial with rapid growth in the peri-urban areas where families are no longer subsistence farmers and are not yet able to fully ente the cash economy of the cities.[13]

Nutrition studies in South Africa[7,14-17] on black pre-school children have highlighted the severity of PEM, especially the high prevalence of stunting. This survey's results are comparable with the RHOSA Nutrition Survey of rural black children.[17] Overall, the most prominent problem found was chronic PEM (stunting).

A higher proportion of children were underweight and stunted in peri-urban and rural areas than in urban areas. This corresponded with lower median MPCFE for these zones compared with urban zones, a finding previously reported.[18]

In Transkei where the infant mortality rate was last estimated to be 130/1 000[1] and where the level of immunisation coverage is still low, most childhood morbidity and subsequent mortality is still due to preventable disease and diseases of poverty, such as gastro-enteritis and PEM.

The percentage coverage for all vaccines was lowest in rural areas. An earlier more comprehensive survey[18] revealed socio-economic problems as well as operational difficulties associated with vaccination coverage. Given the poor socio-economic status discovered in rural areas in this study and the poor vaccination status of migrant Transkeian children found in Cape Town,[19,20] a more systematic approach is needed to improve the situation. Most families that migrate to Cape Town and other cities are from rural areas where the availability of clinics and the affordability of transport to take the child for vaccinations are still critical problems. While rural communities remain economically isolated, rural-urban migrations will continue and with them a chain of disease transmission, especially measles, will stretch from the Transkeian rural areas to Cape Town, Johannesburg and other metropolitan areas.

Conclusion

This study demonstrated the impact of urbanisation on child health and revealed many new challenges as far as health and social services research and administration are concerned. Some of these observations are:

1. While diarrhoea was common in all zones studied, particularly the peri-urban and rural zones, the mother/carer's knowledge, attitude and practice regarding the ORS was universally poor.

2. The MPCFE as a measure of socio-economic status revealed a gross inequality in income distribution as one moves from urban through peri-urban into rural areas. It is partly because of this inequality that people stream towards cities looking for employment.

3. The changing patterns of lifestyles in towns and peri-urban areas have brought about a reduction in the practice of breast-feeding without an appropriate health substitute.

4. The migratory pattern of employment has created even more dependancy in rural areas.

5. Poor nutritional status of pre-school children and especially the chronic forms of PEM are prevalent in rural areas.

6. The immunisation coverage of the studied communities seems to be improving but there are still many measles cases, especially in the rural and the overcrowded peri-urban areas.

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