Health Transition Review

ISSN 1036–4005
Published by the Health Transition Centre, National Centre for Epidemiology and Population Health, The Australian National University, Canberra ACT 0200, Australia.
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Annual subscription: *Health Transition Review*, Health Transition Centre, Fax 61-6-249 0740
Publication frequency: April and October.
Printing by the Printery, The Australian National University
Cover design by Graphic Design Unit, The Australian National University

Health Transition Review 5, 1995, 127 - 142

Determinants of maternal care in a region of South India*

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Abstract

A cross-sectional survey was conducted during 1993 in urban and rural areas of Karnataka State, India. The survey included 3595 currently married women aged under 35, who had at least one child under five. Nine out of ten women had at least one antenatal consultation during their most recent fertile pregnancies. Most consultations were with doctors and there was minimal use of the services provided by paramedical staff of the primary health care system. Of all respondents, 38 per cent (57% urban and 29% rural) delivered in a hospital, and a majority of institutional deliveries were in private hospitals. Surgical interventions were made in more than one-third of hospital deliveries. There was a marked imbalance between antenatal and postnatal care as fewer than one-fifth of the mothers had a postnatal checkup. The educational level, economic status and religion of the mother are significant predictors of use of maternal health services. The relationship of problems during pregnancy and delivery with subsequent health-related behaviour is also examined.

One of the dominant themes of the International Conference on Population and Development held in Cairo in September 1994 was reproductive health. This has been defined as a state in which

> People have the ability to reproduce and regulate their fertility; women are able to go through pregnancy and childbirth safely; the outcome of pregnancy is successful in terms of maternal and infant survival and well being; and couples are free to have sexual relations free of the fear of pregnancy and of contracting disease (Fathalla 1988).

Maternal health services have a potentially critical role to play in the improvement of reproductive health. There is little doubt that access to skilled assistance and well equipped health institutions during delivery can reduce maternal mortality and morbidity and improve pregnancy outcomes. The effectiveness of routine antenatal and postnatal care is less certain. However, a few hospital based studies (Melrose 1984; Boes 1987a, b) and some community

* The Ford Foundation provided financial support for the study, which is gratefully acknowledged. We would also like to record the hard and diligent work of Dr N.S.N. Rao in the organization and supervision of field work and the able assistance provided by Mr N.S. Sanath Kumar and Mr S. Ramaswamy in data processing. The interviewers, who collected data under rigorous field conditions, deserve our appreciation and commendation. Thanks are also due to the Karnataka health and ICDS officials for their full support and co-operation in the conduct of this study.

studies (Kwast et al. 1989; Bhatia 1993) have identified lack of antenatal care as a risk factor for maternal mortality. Analysis of Demographic and Health Surveys (DHS) data from Morocco and Tunisia has shown that higher levels of health care use are associated with better reproductive health outcomes (Obermeyer 1993). There is also some evidence from India that women registered for antenatal care are less likely to experience perinatal and neonatal mortality than those not registered (Srinivasa and Venkatesh 1982; Ramachandran 1989).

The DHS program has made available nationally representative data on the receipt of antenatal and natal care for a large number of developing countries; for India, the 1992-93 National Family Health Survey performed the same function (IIPS 1994). The analysis in this paper goes further than is possible with DHS-type data, by examining the extent to which maternal health behaviour is influenced by the experience of problems in the antenatal and natal periods. Its specific objectives are to describe the health care received by a sample of south Indian women in their last fertile pregnancy; identify the socio-economic determinants of receipt of health care; and identify links between use of services at different stages of the reproductive process and risk factors for adverse outcomes.

Background

The study was conducted in the South Indian state of Karnataka which according to the 1991 Census has a population of 44.8 million, 5.3 per cent of the total Indian population. The male, female and combined literacy rates are 67, 44 and 56 as against the all-India averages of 63,39 and 52 per cent respectively. In the early 1990s, over 80 per cent of pregnant women received at least one antenatal check and 38 per cent of the deliveries were institutional. A little over two-fifths (44%) of married couples are protected against pregnancy through contraception, mainly female sterilization. Thus, in health and family planning programs, Karnataka is progressive compared to many other Indian states. Health, according to the Constitution of India, is a state matter and the states have freedom to adapt their own health services to local conditions. However, most states follow the standard pattern handed down to them by the government of India, albeit with slight variations. Karnataka State has 20 districts and, in each, a district health and family welfare officer (DHFWO) is responsible for overseeing all the health and family welfare activities in the district. These officers are assisted by specialist staff specifically responsible for various programs such as family welfare; maternal and child health including immunization; and communicable disease control. The district hospital is under the control of a district surgeon who is responsible for providing curative and promotive activities including referral services.

At the subdistrict level, assistant district health and family welfare officers (ADHFWOs) are responsible for supervision of medical officers of primary health centres, primary health units and the field staff. A hospital at the subdistrict level is also under the control of an ADHFWO. Each is equipped to deal with obstetric emergencies and should have on its staff a female obstetrician.

The primary health centres, staffed by two medical officers, provide all the basic health services, but they are not equipped for emergency deliveries and few of them have a female doctor. According to the guidelines provided by the Government of India, by the year 2000 there will be a primary health centre for every 30,000 population in the plains and 20,000 population in hilly and tribal areas. The primary health units are unique to Karnataka: each provides services to a population of 15,000 to 20,000 and is staffed by a doctor and an auxiliary nurse-midwife (ANM). The state government plans to upgrade these institutions to primary health centre level in phases by providing minimal additional inputs.

Under each primary health centre there are six to eight subcentres, one for every 5,000 population in the plains and one for 3,000 population in hilly and tribal areas. An ANM and a

male worker look after the health and family welfare activities in the subcentre area. The ANM plays a pivotal role in the provision of health services, and in particular maternal and child health services to the rural population. She is expected to enrol all pregnant women in her area and provide at least four antenatal visits, supervise domiciliary deliveries and provide postnatal care to the mother and the newborn. Since the facilities at the primary health centre, subdistrict and district-level hospitals are inadequate, it is not the policy of the government to encourage normal deliveries in institutions. However, ANMs and other functionaries are specifically instructed to identify high-risk pregnant women during antenatal care and refer them for institutional deliveries. In addition, the ANM is supposed to keep track of cases of difficult labour and arrange to move them to the nearest referral hospital.

In addition to the health facilities provided by the government, there is a strong private medical sector. A large number of private medical practitioners of both traditional and modern systems of medicine are practising in rural and urban areas, many of whom possess no recognized medical qualifications. There are also traditional practitioners who use herbs, oils and incantations and who formerly had little or nothing to do with allopathic medicine. However, they are increasingly using modern medicines and it is difficult for the people to distinguish between a qualified and an unqualified practitioner. These private practitioners also provide family planning and abortion services to their clients (Bhatia 1973; Bhatia et al. 1974). They are very popular among the rural people and their number increases every day (Chuttani et al. 1973; Bhatia et al. 1975). Besides these practitioners, there are now many private hospitals and maternity homes, even in small towns. People find it convenient to use their services because of their easy accessibility. Furthermore, though on paper government health services are free, patients often have to incur certain expenses and do not see much advantage in using services provided by the government. Another major reason for the emergence of a flourishing private sector is that the perceived quality of services at government facilities, particularly those provided by the primary health centre system, is below the expectations of potential users.

Materials and methods

The present study is a part of a major research effort, funded by the Ford Foundation, to investigate the ways in which mothers' education influences child survival. The main study has several components: anthropological studies; investigation of primary schools in three states of India; a cross-sectional survey; and a prospective study. The aim of the anthropological studies was to develop hypotheses and instruments for subsequent quantitative work. During these in-depth investigations it was found that the mother's health is intricately related with that of the child. It was decided therefore to collect detailed information in the cross-sectional and prospective studies on different aspects of mothers' health. This paper is based on data from a cross-sectional survey conducted during 1993 in a subdistrict of Karnataka state situated about 70 kilometres from the capital Bangalore. According to the 1991 Census, the subdistrict has a total population of about 117,000; it has one town with 47,000 inhabitants. The study population comprised mothers aged less than 35 years who had at least one child under five years of age. All eligible women living in the town and the 48 villages having a population of at least 500 persons were included in the sample. A complete list was prepared and attempts were made to interview all of them. To maximize the response rate, at least three call-backs were made, including visits early in the morning and late at night to contact respondents who worked away from home. The achieved sample size was 3595 (2398 in rural areas and 1197 from the town), representing a high overall contact and response rate of over 95 per cent.

Interviewing was by experienced female interviewers who had degrees in social sciences or related subjects and were familiar with the local culture. The female respondents were

asked questions about the problems, consultations and treatments during their most recent live birth. As mentioned, all respondents had a surviving child under five years of age, thus the recall period ranged between about two months and 60 months, with a median value of 21 months. Exploratory analysis showed that the length of the recall period was unrelated to the number or nature of problems reported by women. Accordingly, there was no need to restrict analysis to women with a recent delivery.

The effects of socio-economic, demographic and health-related variables on health-care-seeking behaviour during pregnancy, delivery and the postnatal period were analysed by logistic regression techniques. The dependent variables are represented by receipt of routine antenatal checkup, timing of first checkup, source of antenatal care (private or government), whether or not delivered through caesarean section, and receipt of postnatal checkup. Regressions were performed on each of these dependent variables.

This analysis was not designed to test any formal theory of health-seeking behaviour. Nevertheless, each independent factor was selected for inclusion in the regression analysis for an explicit theoretical reason. Two factors, caste-religion and education, represent the social identity of the respondent. For a host of obvious reasons, length of exposure to formal schooling is expected to be conducive to use of obstetric services. Any influence of the other factor, caste-religion, may be more subtle. The non-Hindus in this sample are mainly Muslims and most public and private sector practitioners in Karnataka are Hindus; insofar as this difference represents a social barrier to use of services, Muslim women may make less use of obstetric health services than Hindus. With regard to Hindus themselves, the possible relationship of caste to service use is likely to be positive. High-caste Hindus, because of their higher educational level, better economic status and participation in community development activities, command considerable influence and thus have greater access to medical and health-care facilities. Conversely low-caste Hindus may be subject to social barriers of a more Western type: fear that they will be treated with arrogance or indifference by practitioners. The relationship of caste to use of services is thus uncertain.

While any effects of social identity on access to services are indirect, other factors provide more direct measures of access. Urban-rural residence is included as an indicator of geographical proximity to services. The one town in the study area is the site of the subdistrict hospital and there are far more private practitioners here than in the villages. Economic status[1] captures a different dimension of access, namely ability to pay. It is expected to be a powerful predictor of the choice between private and public sector provision. Finally, the autonomy[2] of women, namely self-reported freedom of movement and decision-making power, represents a further perspective on access. Women with high autonomy are expected to face fewer domestic and familial barriers to service use than less autonomous women.

Other variables included in the multivariate analysis reflect need or motivation to use services. Thus we expect women who experience problems or complications to make greater use of services, and similarly women with a prior history of abortion, stillbirth or early child loss. Life-course factors such as age at pregnancy and pregnancy order may be negatively

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1 Economic status: this variable was determined on the basis of the imputed financial value of consumer durables such as radios, televisions, fans, refrigerators, furniture, washing machines, bicycles, two-wheel and four-wheel motor vehicles, and agricultural implements such as tractors and threshers. After the total monetary value of these possessions in each household was calculated, the households were categorized into three groups of approximately equal size.

2 Autonomy: each respondent was asked several questions to obtain information about her status in the household. These questions pertained to economic and financial decision making; mobility; communication with the husband on sensitive matters; and her active involvement in important household affairs. The responses elicited were numerically scored and women were categorized into three groups.

related to use of services. The expectation is that young primigravidae will be more diligent in seeking antenatal care and skilled assistance at delivery because their unfamiliarity with reproduction may engender a greater sense of anxiety, and thus of need. A final measure of motivation is represented by the personal hygiene scale[3]. Women who are more concerned about their hygiene are likely to have a greater propensity to use obstetric services than other women.

An important feature of the study is the introduction of self-reported obstetric problems into the battery of explanatory factors. A detailed analysis of obstetric morbidity in this study population may be found elsewhere (Bhatia and Cleland, n.d.). However, a brief account of the nature and incidence of problems reported by women is needed to place in context the results on service use.

To measure obstetric morbidity, a comprehensive list of conditions and their symptoms was prepared. Piloting and pre-testing were then undertaken to ensure that these symptoms were described in everyday terminology that women could understand. In the main survey, the checklist of symptoms was administered to respondents in sequence, starting with the antenatal and ending with the postnatal period.

A total of 18 per cent of all respondents reported at least one morbid symptom during pregnancy and 10 per cent reported symptoms of a potentially serious nature, such as pre-eclampsia, and infection (Table 1). During the delivery itself, nearly 8 per cent of women reported conditions that were potentially life-threatening, the most common of which were prolonged labour and haemorrhage. Postnatal disorders were reported more commonly; altogether 23 per cent indicated one or more problems. Symptoms of possible infection were reported by nearly 17 per cent while 11 per cent recalled more acute and immediately dangerous symptoms such as haemorrhage and loss of consciousness.

Table 1
Main categories of obstetric problems, reported by women

Antenatal	Percentage
Potentially life threatening conditions (e.g. swelling of hands and face, hypertension, fever for 3+ days)	10.2
Severe vomiting	9.6
Associated conditions (varicose veins, urinary problems)	2.6
Natal	
Potentially life threatening conditions (e.g. labour >18 hours, excessive bleeding, loss of consciousness)	7.6
Postnatal	
Potentially life threatening conditions (e.g. excessive bleeding, loss of consciousness)	10.8
Symptoms of infection (e.g. high fever, discharge, lower abdominal or pelvic pain)	16.6
Associated conditions (e.g. depression, painful urination)	4.8

There is considerable overlap in the reporting of these symptom categories. Furthermore, some categories were reported by small numbers of women. For these reasons, the effect of

[3] Personal hygiene: each respondent was asked about her personal hygiene practices such as bathing, washing and combing the hair, washing and changing of clothes, clipping of nails, washing of hands after defaecation and before meals, materials used for bathing and washing. The responses were numerically scored and the respondents divided into three groups.

morbidity on service use is ascertained by comparing women who had any problem or disorder with those who reported no problems.

All variables were categorical in nature or grouped, and for each variable, one category was selected as the reference category. Regression analysis estimates the coefficient for each of the remaining categories of the variable. Results are presented in terms of odds ratios, which express the magnitude of the effect of each category on the outcome, relative to the reference category.

Findings

Patterns of health care

The patterns of health care during pregnancy, delivery and postnatal period by urban-rural residence of women are shown in Table 2. Nine out of ten pregnant women, both in urban and rural areas, reported consultation with a health-care provider during the antenatal period. This level of coverage is slightly higher than that obtained in the 1992-93 National Family Health Survey. In a little more than half the cases, the first consultation was made during the first trimester, while another one-third of women sought consultation during the second trimester of pregnancy. The proportion of women consulting a health professional during the third trimester is relatively small, eight per cent. There are significant urban-rural differentials in the timing of consultation ($\chi^2 = 22.28$, $p < .001$); more urban than rural women consulted during the first trimester.

For nearly half the pregnant women, the main purpose of first consultation was a routine checkup; an additional 32 per cent wished to confirm their pregnancy. Approximately one-sixth of respondents were visited by health workers in their homes. The remaining six per cent visited a health care provider on the first occasion because they had a problem during the pregnancy. The proportion of women consulting a practitioner for pregnancy confirmation is significantly higher in urban than rural areas, however, a larger proportion of rural women received domiciliary visits from health workers. These urban-rural differentials are statistically significant ($\chi^2 = 92.43$, $p < .001$).

In the rural areas 26 per cent of those women who received any antenatal care consulted an auxiliary nurse-midwife and 72 per cent, a doctor. In urban areas, however, almost all consultations were with doctors. The proportion of women consulting a private doctor is significantly higher in urban areas. No attempt was made to ascertain the formal qualifications of doctors and it would be incorrect to assume that all are fully trained allopathic practitioners.

Among the majority who received any antenatal care, the mean number of consultations was 3.7. As shown in Table 3, 96 per cent of women had more than one consultation and over one-third claimed five or more consultations. Analysis by purpose of visit indicates that women who initially go for a routine check or pregnancy confirmation are particularly likely to have subsequent consultations.

Table 2
Health care during pregnancy, delivery and postnatal period by urban-rural residence of women.

	Urban		Rural		Total		
	No	%	No	%	No	%	x^2
A health professional seen during pregnancy	1066	89.1	2164	90.2	3230	89.8	1.23
Timing of first visit							
First trimester	664	62.3	1159	53.6	1823	56.4	22.28***
Second trimester	324	30.4	819	37.8	1143	35.4	
Third trimester	78	7.3	186	8.6	264	8.2	
Purpose of first consultation with health professional							
Routine checkup	440	41.3	1052	48.6	1492	46.2	92.43***
To confirm pregnancy	455	42.7	577	26.7	1032	32.0	
Had a problem	63	5.9	144	6.7	207	6.4	
Others (including domiciliary visits by health professionals)	108	10.1	391	18.1	499	15.4	
Type of health professional consulted							
ANM	17	1.6	562	26.0	579	17.9	362.31***
Govt. Doctor	474	44.5	910	42.1	1384	42.8	
Private Doctor	558	52.3	647	29.9	1205	37.3	
Others, including *dais*	17	1.6	45	2.1	62	1.9	
Received tetanus toxoid during pregnancy	1058	88.4	2184	91.1	3242	90.2	6.51*
Received folic acid	1034	86.4	2140	89.2	3174	88.3	6.31*
Place of delivery							
Home	510	42.6	1705	71.1	2215	61.6	289.12***
Primary Health Centre	0	0.0	5	0.2	5	0.2	
Govt. Hospital	294	24.6	348	14.5	642	17.9	
Private Hospital	393	32.8	340	14.2	733	20.4	
Person assisted (home delivery)							
Doctor	7	1.4	10	.6	17	.8	26.39***
ANM/LHV	62	12.2	298	17.5	360	16.3	
Trained *dai*	15	2.9	126	7.4	141	6.4	
Elderly lady/Untrained *dai* and others	426	83.5	1270	74.5	1696	76.6	
Receipt of postnatal checkup	306	25.6	356	14.8	662	18.4	61.05***
Total number of respondents	1197		2398		3595		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3
Number of professional consultations during pregnancy, by purpose of first consultation.

Number of consultations	Purpose of first consultation				
	Routine check-up	To confirm pregnancy	Had a problem	Others (including domiciliary visits)	All
	%	%	%	%	%
One	4.8	1.3	8.2	6.6	4.2
Two	14.4	3.5	10.3	22.7	11.9
Three	35.8	21.7	18.5	47.5	32.0
Four	15.1	13.7	15.5	11.7	14.2
Five +	29.8	59.7	47.4	11.4	37.7
N	1435	1004	194	480	3113

The relationship between receipt and nature of antenatal care and occurrence of problems during pregnancy is complex. Certainly, it is to be expected that women with problems will be more likely to seek medical advice but it is also likely that some problems or symptoms will be detected only during consultations. In this study, among women with at least one antenatal problem, 83 per cent consulted a doctor, and a further 13 per cent were seen by a paramedic leaving a residue of only 4 per cent who received no antenatal attention. Among the larger group of women who reported no problem during pregnancy, the corresponding percentages are 70, 19, and 12.

Nine out of ten pregnant women reported that they had received tetanus toxoid and folic acid prophylaxis. The proportions of such women are slightly higher in rural areas, but are nevertheless statistically significant (χ^2 = 6.51 & 6.31; $p < .005$).

Of all respondents, 38 per cent (57% urban; 29% rural) delivered in a hospital. This figure is identical to the all-state estimate from the 1992-93 survey. Urban women were much more likely to prefer private to public facilities for childbirth than were rural women. For home deliveries, information was sought about the person assisting the delivery. Because respondents are unlikely to be able to distinguish between trained and untrained *dais*, the name of the *dai* was ascertained where relevant. Names were then cross-checked against lists of women who had received training to establish their status. The responses indicate that, both in urban and rural areas, 77 per cent of home deliveries were conducted by untrained *dais* and elderly ladies; trained assistance was available only in a few cases, most notably by ANMs or Lady Health Visitors, who together supervised 16 per cent of all home deliveries. Only six per cent of women reported assistance from a trained *dai*.

Table 4 presents a preliminary analysis of the links between types of person seen at first antenatal consultation, experience of problems during pregnancy and place of delivery. As expected, there is a considerable degree of continuity in the nature of obstetric care. Large majorities of women who had no antenatal care or were seen by a paramedic (typically an ANM) delivered at home, 88 and 85 per cent, respectively. This proportion falls to 67 per cent among those who consulted a government doctor and further to 35 per cent for those who saw a private practitioner. There is also a degree of continuity in the choice between public and private sectors. Nearly half of those consulting a private practitioner at the first antenatal visit delivered in a private institution, compared to only eight per cent among women who consulted a government doctor.

Table 4
Place of delivery, by type of first antenatal consultation and presence of antenatal problems

Type of consultation/ problem	Place of delivery (%)			
	Home	**PHC/Govt. hospital**	**Private hospital**	**N**
No consultation				
Problem	80.0	16.0	4.0	25
No problem	88.9	7.9	3.2	343
All	88.3	8.4	3.3	368
Consulted paramedic				
Problem	72.0	13.4	14.6	82
No problem	86.9	8.5	4.5	550
All	84.9	9.2	5.9	632
Consulted govt. doctor				
Problem	56.8	32.3	10.9	229
No problem	69.1	23.7	7.2	1153
All	67.0	25.1	7.8	1382
Consulted private doctor				
Problem	26.0	15.0	59.0	307
No problem	38.0	18.1	43.9	897
All	35.0	17.3	47.7	1204

Regardless of the nature of medical supervision and advice during pregnancy, those who experienced antenatal problems were more likely to seek an institutional delivery than those who reported no problems. Differences between the two groups are not large, however, but are explored further in the multivariate analysis.

Whereas antenatal coverage is impressively high, receipt of a postnatal check is much less common. Approximately one quarter of urban and one-seventh of rural women reported a checkup during the six weeks postnatal period. This differential is statistically significant ($\chi^2 = 61.0$, $p < 0.001$).

The relationship between socio-economic characteristics, biomedical or demographic risk factors and health-care seeking behaviour are now assessed through multivariate statistical techniques. The results are summarized in Table 5.

Predictors of antenatal care

It will be recalled that women received antenatal care either by visiting a provider or at home from outreach staff: the purpose of the consultation varied between routine checkup, confirmation of pregnancy and treatment of a problem. A visit to a provider for checkup or confirmation of pregnancy without any perceived problem indicates a degree of conscious effort and motivation on the woman's part to take care of her own health as well as that of the newborn. Furthermore Table 3 shows that the majority of such women have at least two consultations during pregnancy. What are the characteristics of women who demonstrate such health consciousness? To answer this question, the appropriate logistic regression was performed only for respondents who reported no antenatal problem.

Table 5
Logistic regression of health care during pregnancy, delivery and postnatal period by selected characteristics of women

Characteristics		(Total sample)	Odds ratios						
			1 Routine antenatal check up	2 Check during first trimester	3 Private source of antenatal care	4 Institutional delivery	5 Delivery in private institution	6 Caesarean section	7 Post natal check up
Residence	Urban	1197	0.92	1.05	2.18***	2.57***	1.42**	1.30	1.35*
	Rural[a]	2398							
Caste	Non-Hindus[a]	333							
	High	182	0.53*	0.97	0.79	0.59*	0.52*	1.11	1.10
	Middle	2128	0.83	1.01	1.04	0.86	0.92	1.74	1.21
	Low	951	0.53***	0.89	0.59***	0.51**	0.64	1.25	1.09
Education	None[a]	1888							
	1 - 5	504	1.59***	1.12	1.45**	1.99***	1.17	1.46	1.10
	6 +	1203	1.71***	1.44***	2.54***	3.17***	1.49*	2.23*	1.58*
Economic status	Low[a]	1194							
	Middle	1188	1.07	1.11	1.59***	1.23*	1.87***	1.59	1.24
	High	1208	1.16	1.17	2.62***	1.55***	3.07***	1.43	1.20
Age at pregnancy	< 18	211	0.44***	0.81	0.74	0.94	0.73	0.75	0.83
	18 - 24[a]	2096							
	25 +	1263	1.08	1.04	1.14	1.27*	1.18	0.96	1.46**

Pregnancy order	1	674	1.83***	1.39**	1.26*	2.47***	1.24	1.84*	1.19
	2 - 4[a]	2518							
	5 +	403	0.55***	0.63***	0.77	0.41***	0.79	0.20*	1.16
Autonomy	Low[a]	1626							
	Medium	1224	1.18	1.00	1.23*	1.04	1.61**	0.85	1.04
	High	745	1.40	0.96	1.12	1.20	1.49**	1.07	1.32
Personal hygiene	Low[a]	1317							
	Medium	1101	1.28*	1.47***	1.89***	1.34**	1.44*	0.85	0.94
	High	1177	2.15***	2.14***	2.28***	1.98***	1.85***	1.18	0.90

Characteristics		(Total sample)	Odds ratios						
			1 Routine antenatal check up	2 Check during first trimester	3 Private source of antenatal care	4 Institutional delivery	5 Delivery in private institution	6 Cesarean section	7 Post natal check up
History of abortion/still birth/neo-natal death	Yes	823	1.28*	1.27*	1.27*	1.61***	1.40*	3.12***	1.09
	No[a]	2772							
Place of delivery	Home	2214							0.50***
	Private	733						2.57***	1.88
	Government[a]	647							
Antenatal problems	Yes	366			1.64***	1.91***	1.52*	1.49	1.23
	No[a]	3229							
Natal problems	Yes	274						6.16***	2.40***
	No[a]	3321							
Surgical interventions in delivery	Yes	467							
	No[a]	3128							1.25

a Reference category

b includes only women with no problems

c includes only women with any antenatal visit

d includes only women having an institutional delivery

*	p< 0.05
**	p< 0.01
***	p< 0.001

The results are shown in the first column of Table 5. Among the social and economic factors, education and the index of personal hygiene emerge as strong positive predictors. The effects of economic status and autonomy are in the expected direction but are much weaker and do not attain statistical significance. The non-Hindus, mainly Muslims, are much more likely to seek routine antenatal care than Hindus. The explanation may lie in the possibility that high-caste Hindus generally confine themselves to their homes while lower-caste women, many of whom work as agricultural labourers, have insufficient time for checkups. On the contrary the participation of the Muslim women in the labour force, particularly as agricultural labourers, is generally lower and it is much easier for them to find time to seek medical care.

All the risk factors for adverse obstetric outcomes are significantly related to the probability of seeking antenatal care. A total of 823 women reported a prior foetal loss or neonatal death; this figure was derived from the complete pregnancy histories that formed part of the questionnaire. These women are more likely to receive an antenatal check (OR = 1.28) than women without prior losses. Pregnancy order is very strongly related to health-seeking behaviour. As hypothesized, primigravidae are much more likely to report an antenatal check (OR = 1.83) than women having their second, third or fourth pregnancy. However multigravidae are much less likely to seek routine care; obstetric experience clearly inculcates a degree of casualness with regard to preventive checks. Only 211 women in the entire sample were aged less than 18 years at the time of the pregnancy. Net of the effect of pregnancy order and other factors in the model, these high-risk young mothers are significantly less likely than older mothers to receive routine care during pregnancy . After 18 years, however, age is unrelated to health behaviour.

The timing of an antenatal check is important. Some pregnancy-related problems, if not diagnosed and treated early, may endanger the mother and foetus. The predictors of a first trimester check, among women receiving any preventive health care during pregnancy, are shown in the second column of Table 5. Education again emerges as an influence, though it is only the highest educational group, comprising women with six or more years of schooling, whose behaviour differs from uneducated women. Self-reported hygiene is again a powerful predictor. It appears that this variable represents a socio-psychological dimension of considerable influence on health-related behaviour, independently of education, economic status and caste. Pregnancy order and a history of adverse obstetric outcomes are also significantly related to the timing of antenatal checks.

Public sector sources of antenatal consultation, checkup and treatment include subcentres, primary health centres located in the rural areas, and subdistrict and district hospitals and maternity homes in the urban areas. As mentioned earlier, a large number of private medical practitioners, both qualified and unqualified, also practise in both rural and urban areas, and several small nursing or maternity homes and hospitals are located in the study area. The private sector in India in general and Karnataka in particular is becoming increasingly strong and government services often remain underused. Who uses private rather than government facilities? The results of logistic regression, shown in column 3, indicate that urban residents, those with higher levels of education and economic status, hygiene-conscious respondents, women having their first pregnancy, and those with a previous history of stillbirths or abortions are more likely to seek antenatal care from private sources than women with other characteristics. Furthermore, women experiencing problems during pregnancy are also likely to seek private medical care.

Clearly resort to private-sector care reflects ability to pay: hence the strong effect of economic status which was not a predictor of receipt of any type of antenatal care nor of its

timing. At the same time, the fact that personal hygiene, education and risk factors for adverse outcomes are also significantly related to choice of private over public sector care suggests that women believe that they will obtain a higher quality of service from private than from government practitioners.

Predictors of place of delivery and use of instruments

The 1992-93 National Family Health Survey shows that 26 per cent of all births in India in the early 1990s occurred in institutions; the diversity between states is very wide, ranging from 6 per cent in Nagaland to 88 per cent in Kerala. The coverage in Karnataka, at 38 per cent, is well above the average and places the state in sixth position out of 25 states. Column 4 of Table 5 shows the net predictors of institutional delivery among this study population. Almost all factors selected for analysis have a statistically significant relationship. Urban residence, high educational and economic status and high hygiene consciousness all exert strong net influences. In line with the results for antenatal care, Muslims are more likely than Hindus to deliver in a hospital.

The links between age and place of delivery are weak, but pregnancy order emerges as a strong influence, with adjusted odds of 2.47 for primigravidae relative to women having a second to fourth pregnancy. Approximately ten per cent of the sample reported a problem during pregnancy, the most common of which were severe vomiting, swelling of hands and face, hypertension and fever. These women are much more likely to seek an institutional delivery than problem-free women. This is an important finding because it implies that women make an appropriate response to symptoms of possible disorders or are referred by practitioners. Similarly, a history of prior obstetric problems is significantly related to the probability of having an institutional delivery.

As noted earlier, the number of private nursing homes in urban India is increasing rapidly. Determinants of the type of institution used by women for childbirth are assessed in column 5, where the analysis has been restricted to women having institutional delivery. The factors that influence the private-versus-public-sector decision are similar to those that influence the institutional-versus-home decision. Thus, factors such as urbanity, education, pregnancy order and other risk factors for adverse pregnancy outcome are more decisive for the latter decision than the choice of a private over a public institution. The clear exceptions are autonomy and, not surprisingly, economic status.

Surgical interventions in delivery all over the world are on the increase. In this study, surgical interventions were made in more than one-third of hospital deliveries; episiotomy was performed in 23.5 per cent of cases, and 8 per cent of these women were delivered through caesarean section. The results of logistic regression analyses indicate that higher levels of education, pregnancy order, a history of abortions or stillbirths, delivery in a private hospital and problems during delivery are strong predictors of caesarean section: the women with these characteristics are two to six times more likely to deliver through caesarean section than other women. The effects of economic status are in the expected direction but are relatively modest and are not statistically significant. It may be inferred that ability to pay is not a major influence on the decision to deliver by caesarean section. The index of personal hygiene is also unrelated to the type of delivery.

Predictors of postnatal checkup

While nine out of ten women had a consultation with a health care provider during pregnancy, less than one-fifth had a checkup within six weeks of delivery. The characteristics positively and significantly associated with postnatal checkups are shown in column 7: urban residence, six or more years of education, 25 and more years of age, delivery in a private

hospital and problems during delivery. It is rather surprising that neither the personal hygiene score nor pregnancy order, strong predictors of antenatal and natal care, are related to the probability of seeking a postnatal check.

Discussion

There is widespread belief that care during pregnancy, delivery and the postnatal period can improve the health of the mother and the infant. Although the effectiveness of preventive antenatal and postnatal care is not clearly established, there are certain conditions whose early detection can reduce maternal mortality and reproductive morbidity. In developing countries where the prevalence of several treatable diseases is very high, maternal health services provide a unique opportunity to detect and treat these diseases. Although certain obstetric emergencies cannot be predicted through antenatal screening, women at least can be educated to recognize symptoms leading to potentially serious conditions and take immediate action. Furthermore, through contacts with pregnant and recently delivered women, health workers and professionals can discuss other health-related issues such as family planning, immunization, child health, and nutrition. It is therefore important to improve maternal health services through more effective and efficient delivery systems. An adequate knowledge of health-care seeking behaviour of women during the entire reproductive process and their determinants can facilitate the management of such a system.

This study indicates that nine out of ten women had at least one antenatal consultation during their most recent fertile pregnancies: an impressive coverage. Most earlier studies of this topic however have assumed that antenatal services are obtained from health centres or at domiciliary visits by paramedical staff (e.g., Kanitkar and Sinha 1989). In this study, 97 per cent of urban women and 72 per cent of rural residents consulted a doctor. Use of the services provided by paramedical staff of the primary health care system was minimal in rural areas. There is thus a need for radical reappraisal of the role of paramedical staff at health centres and subcentres in the provision of maternal health care. Furthermore, a large number of consultations were with private medical practitioners. Realistic planning of maternal health services must take into account the existence of such practitioners and devise appropriate strategies to upgrade their skills, regulate their activities and in all possible ways enhance the quality of their contribution to better reproductive health.

Despite the fact that most women see a medical practitioner during pregnancy, the study found that a majority of the deliveries take place at home and are attended by untrained *dais* and elderly ladies. Probably most of them lack knowledge of aseptic techniques of delivery and many follow superstitious customs and practices which may endanger the health of the mother and the child. India was the first developing nation to recognize these dangers and to start training traditional birth attendants. Since 1978, the United Nations Fund for Population Activities and other international agencies have provided funds for traditional birth attendant training schemes in India. Thousands of traditional birth attendants were trained and it was proposed to have at least one in each village; it is therefore well worth exploring why they are not used by the community. Similarly, ANMs supervise rather few deliveries in this population.

Of the deliveries that took place in hospitals, the majority were in private institutions. Private nursing or maternity homes and hospitals are becoming increasingly popular even among the rural people because of the poor reputation of the government hospitals. People willingly incur substantial expenses at these institutions rather than availing themselves of cheaper services from government facilities. The need is obvious to improve the quality of government hospitals.

The study revealed a marked imbalance between antenatal and postnatal care. Less than one in five of all respondents received a postnatal check, despite the fact that self-reported

morbidity in the six weeks following childbirth was rather high. There thus appears to be an important gap in Karnataka's maternal health services, that warrants further investigation.

The analysis of determinants or predictors of use of maternal health services not only confirmed some expected patterns but also yielded some surprising results. It is not surprising, for instance, that women's education is such a pervasive influence or that resort to private services is heavily conditioned by economic status. In another study in South India clear differences were observed between educated and uneducated mothers in seeking medical treatment for children (Caldwell, Reddy and Caldwell 1983). Similarly the large urban-rural differential in the prevalence of institutional deliveries was anticipated for reasons of greater access though it is interesting that rural women were just as likely as urban women to seek antenatal care.

The strong religious differential in this subdistrict of Karnataka was unexpected. The common view is that Muslim women are less likely than Hindus to make use of medical services, but in this study, the reverse was true. A further interesting finding concerns the consistently strong effect, net of all obvious confounding factors, of self-reported hygiene. Few studies have attempted to measure such individual attributes and the results imply that there exists a considerable heterogeneity among women that is not captured by more conventional socio-economic indicators and therefore goes unobserved in most analyses.

Women's autonomy on the other hand, failed to emerge as a strong predictor of use of antenatal or delivery services. However, it was significantly related to the choice of private rather than public sector care. This relationship probably has no connection to mobility but may reflect the fact that women who have greater decision making power are more able than other women to exercise a preference for more expensive private care.

A final distinctive contribution of this study is its examination of the relationship between obstetric problems and subsequent health-related behaviour. The results are encouraging, in that women who experienced problems during pregnancy were more likely to seek medical supervision or delivery at an institution. Similarly, those who experienced difficulties during delivery, most commonly prolonged labour or excessive bleeding, were more likely to go for a postnatal check.

Surgical interventions were made in 13 per cent of deliveries. If this proportion is recalculated only for hospital deliveries, 34 per cent of women were delivered with the aid of surgery, eight per cent by caesarean section. Caesarean sections are increasing all over the world: levels ranging between 27 and 32 per cent have been reported in some Caribbean and Latin American countries (Janowitz et al. 1985; Webster et al. 1992). The results also indicate that the probability of caesarean section is several times higher in private hospitals than in government hospitals: similar findings have been reported elsewhere (Taffel 1989). Surgical interventions in delivery necessitate longer hospital stays, higher expenses and increased morbidity and mortality rates. In addition, they represent a growing burden on scarce medical resources in developing countries. The increasingly high levels of caesarean section in private hospitals are also indicative of commercialization of medical care: there is an urgent need for further studies in this area.

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Health Transition Review 5, 1995, 143 - 163

The effects of access to health care on infant mortality in Indonesia*

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Abstract

This paper examines the impact of access to health facilities and personnel on infant and child mortality in Indonesia. Demographic and Health Survey data are combined with village-level censuses of infrastructure collected by the Central Bureau of Statistics. Because the village-level data are available from two points in time, it is possible to analyse the effects on mortality risks within the village of changes in access to health care. Factors about villages that might affect both access to health care and mortality risks are held constant. Adding a maternity clinic to a village decreases the odds of infant mortality by almost 15 per cent, in comparison to the risk before the clinic was added. An additional doctor reduces the odds by about 1.7 per cent.

Governments in developed and developing countries alike have long promoted the health of their populations by subsidizing health care services. Common reasons for the subsidies are the belief that externalities arise from a healthy population, or that government is the guarantor of the right to good health. In the past two decades national governments, multilateral development agencies, and private voluntary organizations have focused on bolstering developing countries' institutional capacities to provide health care (Grant 1990: 532; Jamison and Mosley 1991).

Efforts to evaluate the impact of interventions on health outcomes have accompanied initiatives to provide services. Evaluation research is important, as resources available for subsidizing health care have shrivelled since the worldwide recession of the early 1980s and the ensuing international debt crisis, for three reasons: growth in GDP slowed during the mid-1980s; interest payments on public debt have drained national budgets and diverted money away from subsidies to public services; and at an individual level, inflation and unemployment have reduced purchasing power (Commission on Health Research for Development 1990). Accordingly, policy makers have increasingly emphasized the importance of choosing from among alternative programs and interventions those with the greatest potential to affect health outcomes. The concern with priorities is visible in several major policy initiatives, such as UNICEF's GOBI-FFF strategy and the World Bank's recent health sector priorities review (Grant 1990:532; World Bank 1990).

This paper examines the impact of access to health facilities and personnel on infant and child mortality in Indonesia; it explores the spatial distribution of health services and accounts

* This research was undertaken while the author was a graduate student at the University of Pennsylvania. She is now an associate social scientist at Rand. The research was supported by grants from the Demographic and Health Surveys and from the Mellon Foundation. The suggestions of Douglas Ewbank, Andrew Foster, Bambang Kristianto, Samuel Preston, Herb Smith, Duncan Thomas, and two anonymous referees are gratefully acknowledged.

for these processes in a model relating the mortality risks of individuals to access to health services.

The results of the analysis should inform policy-makers as to the effectiveness of various health interventions, as well as contribute to an understanding of the determinants of mortality. While researchers have devoted considerable attention to the impact of individual-level biomedical, demographic, and socio-economic characteristics on health outcomes, considerably less is known about how community institutions affect health, particularly at a national level, though such institutions are included in theoretical models of health.[1] Reasons for this dearth of knowledge include inadequate data and the methodological difficulties of multilevel analysis (Hobcraft 1985). In particular, few analyses have controlled for the fact that institutions may be targeted to certain types of communities.

The data for this analysis are drawn from two sources. Community-level data on access to health services come from censuses of village infrastructure conducted by the Indonesian Central Bureau of Statistics in 1983 and 1986. Information on levels of socio-economic development was collected from the village leaders and other village officials. The questionnaires vary little across the two years. These data are unique in that they are available from two points in time for each of Indonesia's 63,000 villages. The information about health services, however, is rudimentary. Individual-level data on infant mortality are from the 1987 Demographic and Health Survey for Indonesia, a nationally representative sample of 11,884 women. Retrospective birth histories are available from this data set, as is information on individual and family-level determinants of mortality. Calculations from the 1987 DHS yield an infant mortality rate of 75.2 per thousand for the period 1977-1987 (DHS 1991). Women surveyed in the 1987 DHS are matched by block to census data on characteristics of the villages (*desa*) and subdistricts (*kecamatan*) in which they reside. The matching process was tedious but successful: all but ten DHS villages were matched to the community data.

The remainder of this paper discusses related studies, describes health services in Indonesia, explains the methods used in the analysis, presents the results, and discusses them.

The effects of access to services on infant and child health outcomes

A number of studies of the determinants of infant and child mortality include measures of access to health facilities or personnel. A brief review follows of studies of individual-level mortality risks, focusing on studies that use data from large, national-level household surveys.

Al-Kabir (1984) assesses the effects of distances to hospitals, government dispensaries, family planning clinics, qualified doctors, other doctors, and traditional birth attendants on neonatal, post-neonatal, and child mortality in Bangladesh (Bangladesh Fertility Survey Data 1975-76). Bivariate associations between these variables and mortality are consistent with the hypothesis that proximity to care decreases mortality.

The association between distance to health facilities and mortality of children under five weakens considerably with the inclusion of controls for individual and household variables, such as length of previous birth interval, and maternal age and education. Even with controls, however, increasing distance to a hospital is accompanied by a rise in mortality risks of children: mortality rates for children living further than ten miles from a hospital are 40 per cent higher than those for children living within three miles. Children also fare poorly when they live far from a qualified doctor. Mortality rates are 54 per cent higher when children live further than five miles from a doctor than when a doctor resides in their village.

Proximity to a family planning clinic reduces the mortality of both children and neonates. Mortality rates are 30 per cent higher for newborns living further than ten miles from a clinic

[1] See, for example, Mosley and Chen 1984, Schultz 1984, 1985; Boulier and Paqueo 1988.

than for newborns living within three miles, while children ten miles away have 60 per cent higher mortality than children living closer. This relationship may have occurred because at the time of the survey, family planning clinics participated in supplementary feeding projects and were also sources of maternal and child health care.

Al-Kabir's results are generally confirmed by Hossain's (1989) analysis of data from the Bangladesh Institute for Development Studies. Presence within a village of family planning clinics lowers the child-mortality experience of women, as does presence of a dispensary.[2] Presence of hospitals does not lower mortality. Controls include maternal education and childhood residence, and paternal education, income, and occupation.

DaVanzo (1984) tested for a relationship between distance to facilities and infant mortality with data collected as part of the Malaysian Family Life Survey. She found no evidence of such a relationship, possibly because the mortality data date as far back as to the late 1940s while the facility data refer to the time of the survey.

In an analysis of data from the 1973 Colombia census, Rosenzweig and Schultz (1982) found that clinics and hospital beds are associated with lower child mortality ratios (see Footnote 2), particularly in urban areas, but the effects of these variables decline dramatically with the addition of controls for municipality-level average women's schooling attainment. Family planning expenditures exert only a small effect on the mortality ratios of younger urban women, while rural health posts have no significant effects on mortality ratios in rural areas. Rosenzweig and Schultz also included information on the municipality-level availability of public and private clinics, dispensaries, and mobile care units, but found no effect on mortality ratios.

In India (1971 census data) availability of family planning clinics and dispensaries significantly reduces women's child mortality ratios, while hospitals have a negative but insignificant effect on mortality (Rosenzweig and Wolpin 1982). The presence of other health facilities, such as health centres, subcentres, and maternal child welfare clinics, significantly reduces child mortality. In simulations of the effect of increasing facility availability, Rosenzweig and Wolpin found that doubling the number of villages with family planning programs would reduce child mortality ratios by about 10 per cent, while doubling the number of villages with dispensaries would lower the ratios by 25 per cent.

Several studies examine the effect of access to health care on childhood nutritional status. In Brazil, higher per capita numbers of nurses within municipalities are associated with being short for one's age among children of literate women living in urban areas (Thomas and Strauss 1990). Increasing numbers of hospital beds per capita are also associated with shorter children. The authors speculate that these perplexing results arise from a failure to control for quality of services, or because larger facilities may be disproportionately located in areas where health outcomes are poor.

In the C™te d'Ivoire, increasing distance to health facilities is associated with lower height and weight for height, but the coefficients are small and statistically insignificant (Strauss 1990). Children are significantly lighter and shorter when they live in communities where village leaders report problems with medical facilities, such as lack of medicine or congestion. Apparently, the absence of a traditional practitioner improves nutrition outcomes.

No clear picture of the effects of access to services on health outcomes emerges from these studies. Some health services improve health outcomes in some settings (Rosenzweig and Wolpin 1982; Al-Kabir 1984; Hossain 1989). In other settings access to services appears to have no effect on health outcomes (Rosenzweig and Schultz 1982; DaVanzo 1984; Strauss

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[2] The dependent variable in Hossain's analysis is the ratio of the observed proportion of a woman's children that have died relative to the expected proportion, where the expected proportion is calculated from a standard mortality schedule. The method is described in detail in Trussell and Preston (1982).

1990). Occasionally certain services appear to worsen health outcomes (Rosenzweig and Wolpin 1982; Thomas and Strauss 1990).

While it is unreasonable to expect perfect consistency across studies from a multitude of countries and time periods relating disparate health services to various health outcomes, the review fails to build a compelling body of evidence regarding the importance of health services. Possibly access to health services is not a crucial determinant of health status, or perhaps measures of access to health services do not capture the dimensions of services that affect health outcomes, quality of care for example. Or perhaps measures of health status do not incorporate the aspects of health that are affected by access to facilities.

It is also possible that the approaches adopted by the analyses reviewed here are statistically flawed by unobserved, and hence omitted, factors. The processes that produce the distribution of health services relative to the characteristics of individuals are rarely known to researchers but can bias the measured effects of services on behaviour and outcome. For example, public health care may be targeted to the poor, who have relatively poor health. If the analysis does not control for this non-random element in service allocation, access to public health care may appear to produce poor health.[3]

Rosenzweig and Wolpin (1986) illustrated this problem in an analysis of the effects of health and family planning programs on the standardized height and weight of Filipino children. They experimented with three specifications of the relationship. The first specification is a simple OLS cross-sectional regression of height and weight of children as a function of the existence of health and family planning programs within the *barangay* in which the children reside. The second specification is a fixed effects model that removes the effect of the *barangay* on nutritional status. The third specification uses data from two points in time to control for differences among children in exposure to the program, arising from differences in age of the children and differences among *barangay* in the time when programs became available.[4]

The first two specifications produce statistically insignificant relationships between nutritional status and the existence of health and family planning programs. Both programs appear to decrease height, and health clinics appear to decrease weight. The first-differenced regressions produce completely different results. Exposure to health or family planning programs has a positive and significant effect on both height and weight. Children living in areas where, and time periods when, a family planning program has always been available are seven per cent taller and twelve per cent heavier than children who have never lived in an area with a program. Children who have always lived in an area with a health clinic are five per cent taller and nine per cent heavier than children who have never lived in such an area. Rosenzweig and Wolpin (1986) attributed the change across the models in the estimated coefficients to the non-random placement and timing of placement of clinic services.

Two other studies using analogous methods with Indonesian data make similar points: that of Gertler and Molyneaux (1994) with respect to fertility and Pitt, Rosenzweig, and Gibbons (1993) on child mortality. Pitt et al. show that estimates of the effects of schools, family planning, and health clinics on subdistrict mortality rates are considerably different from the results obtained when changes in subdistrict mortality rates over time are explained as a function of changes in access to care within that subdistrict: an analysis of covariance

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[3] The location of private facilities is also susceptible to manipulation by processes the researcher cannot observe, such as a profit motive on the part of private practitioners.

[4] The third specification is a first-differenced regression using matched samples from 1975 and 1979, so that differences in nutritional status between the two time periods are related to changes in the duration of exposure to the program.

with dummy variables approach. The results from the analysis of the covariance model indicate that none of the program variables affect child survival.

Health services in Indonesia

The idea is intuitively credible that regression results could be biased by unobserved processes generating a distribution of health services that is non-random with respect either to health status or to its determinants. Within the public sector planners surely allocate health services according to some design, whether it is to target high morbidity or mortality areas for receipt of services, or to place facilities in villages most accessible to large numbers of people. Within the private sector, practitioners almost certainly locate services in areas where clients want private care and can afford to pay for it.

In the context of structuring an evaluation of health services in Indonesia, it is useful to consider evidence that mechanisms such as those described above indeed operate. Evidence emerges both from stated policies of the Ministry of Health and from empirical analyses.

The Ministry of Health allocates hospitals, health centres (*puskesmas*), and health subcentres (*puskesmas pembantu*) according to a set of general guidelines. Government hospitals are located in district capitals (*kabupaten*), limiting their accessibility to rural residents: a district consists of 300 to 500 villages (USAID 1988). Health centres are the basic source of primary health care, particularly in rural areas. Health centres are generally located in the subdistrict capital and headed by a doctor, who oversees a midwife, one or more nurses, and various paramedical workers (MOH 1990). Each subdistrict, consisting of 20-40 villages, claims at least one health centre; densely populated subdistricts in urban and suburban areas have more than one. In addition to health centres, health subcentres are located in the more peripheral villages of remote subdistricts in which travel is difficult. Subcentres are either staffed by resident paramedical workers or are opened only once or twice a week by workers travelling out from the health centre (Berman, Ormand and Gani 1987; MOH 1990).

In Indonesia private practitioners, including paramedics, midwives, and doctors, are an important source of health care (Haliman and Williams 1983; Berman, Sisler, and Habicht 1989; Linnan 1990; Streatfield, Tampubulon and Surjadi 1990). The distribution of private practitioners partly reflects facility allocation policies of the Ministry of Health, because staff of public facilities almost always operate private clinics and practices after public facilities have closed for the day (Berman et al. 1987; USAID 1988). Villages with a health centre are likely to have a doctor's practice and midwife's delivery clinic as well, and sometimes health centre staff may also open practices in nearby villages. On the other hand, some private practitioners have no connection to government facilities. Generally private services are far more available in urban than in rural areas; this suggests that private practitioners prefer more developed areas where residents demand private services and can pay for them (Brotowasisto et al. 1988; World Bank 1990b).

Ministry of Health policies and other studies of Indonesian health services suggest that the distribution of health facilities, both public and private, is related to factors such as population density, level of socio-economic development, integration into transport networks, and administrative rank, all of which may be related to morbidity and mortality. Data from the 1986 census of village infrastructure confirm these patterns. Table 1 presents correlation coefficients among various community institutions: hospitals, health centres, health subcentres, doctors' practices, maternity clinics, health workers, high schools, and traditional midwives. Levels of community institutions are measured as the proportion of villages in a subdistrict with the attribute in question. The community data are available at two levels of aggregation: the village and the subdistrict; Table 1 analyses service availability in the

subdistricts within which the DHS villages were located. Land area and population of each subdistrict are included, as is the proportion of villages receiving INPRES development money: presidential grants targeted to underdeveloped areas.

Defining the terms that refer to various types of health services involves first linking the names of health facilities that appear in the Central Bureau of Statistics village infrastructure questionnaire both to Ministry of Health descriptions of health services in Indonesia and to other descriptions in the general literature; then thinking about how village leaders unfamiliar with the terms or their Ministry of Health meanings might interpret them. This process is inevitably imprecise, particularly with respect to maternity clinics and health workers. I use the term maternity clinic to refer to a public or private health service that provides prenatal care, in-patient delivery service, postnatal care and well-baby care, and is staffed by a doctor or a midwife, or both. Facilities encompassed by the term maternity clinic are likely to range from sophisticated hospitals specializing in obstetrics to small delivery clinics operated by midwives in their own homes.[5] I use the term 'health worker' to refer to people the village leader has identified as having some health expertise. Health workers potentially include everyone from unlicensed injectors and graduates of the Health Worker Training Schools of the 1960s to recently trained nurses, midwives, and paramedics such as nutritionists and sanitarians.

Several interesting patterns emerge from Table 1. First, population size is positively correlated with levels of the more 'modern' community institutions: hospitals, health centres, maternity clinics, doctors' practices, and secondary schools. In contrast, population size is negatively correlated with levels of health subcentres and receipt of INPRES funds. Land area, on the other hand, exhibits an opposite pattern. Land area is positively correlated with levels of health subcentres and INPRES money, but negatively correlated with levels of the more modern institutions.

Correlations among hospitals, health centres, maternity clinics, doctors' practices, and secondary schools are generally high, 0.6 and above. These institutions are much less strongly correlated with health subcentres: coefficients are all less than 0.10. Modern institutions are negatively correlated with INPRES money: coefficients vary from -0.25 to -0.53. The correlation between INPRES and health subcentres, however, is positive, 0.21. In sum, the more modern institutions tend to cluster together in areas of population concentration. Health

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5 The community questionnaire asks about the number of *Rumah Sakit Bersalin/BKIA* in each village and in the 1986 explanatory notes defines these to be facilities where 'women can receive prenatal care, give birth, and receive postnatal and well-baby care, typically staffed by a doctor and midwife.' The term *Rumah Sakit Bersalin* (*RSB*) suggests a public or private multi-practitioner hospital specializing in obstetric care: a rare entity in Indonesian villages. The term BKIA refers to the precursors to health centres, which were clinics headed by a midwife and specializing in maternal and child health (Hugo et al. 1987:110; MOH 1990). During the 1970s and 1980s the BKIA were generally converted to government health centres headed by doctors, and the term is no longer in common use by the Ministry of Health, although it appears in the censuses of village infrastructure conducted by the Central Bureau of Statistics. Because the censuses also ask about the presence of government health centres into which the BKIA were converted, it is not clear that many government clinics would be reported as RSB/BKIA. Meanwhile, another source of obstetric care and delivery assistance is becoming increasingly common in Indonesia: small-scale private clinics operated by midwives who have connections to doctors and hospitals where they can refer complicated cases (Soh-Sanu 1989). These facilities are not RSBs by the strict Ministry of Health definition of the term; however, they more closely fit the RSB/BKIA category and description than any other category in the community questionnaire, so village leaders would probably report them here: far more villages report these facilities than could be expected to have RSBs by the strict Ministry of Health definition.

subcentres, and to a lesser extent health workers, are less likely to be in populated areas and their presence is only weakly related to the presence of other, more technology-intensive institutions. INPRES funds do appear to be successfully targeted toward underdeveloped subdistricts: underpopulated areas with relatively few hospitals, high schools, health centres, or doctors.

Table 1
Correlations among community facilities, subdistrict level Indonesian Census of Village Infrastructure (1986)

	LA	Pop	Hosp	MC	HC	HSC	Dr.	HW	TM	SS	INPR
Land area	1	-.16	-.15	-.21	-.17	.03	-.24	-.26	-.02	-.22	.08
Population		1	.56	.69	.77	-.20	.64	.47	.08	.55	-.25
Hospitals			1	.66	.59	.05	.69	.51	-.08	.61	-.53
Maternity clinics				1	.76	.07	.79	.65	-.02	.74	-.30
Health centres					1	0	.74	.54	.15	.70	-.26
Health subcentres						1	.04	.32	.09	.29	.21
Doctors							1	.72	-.19	.80	-.32
Health workers								1	-.07	.78	-.07
Trad. midwife									1	-.03	.03
Second. school										1	-.23
INPRES funds											1

Taken together, stated policies of the Ministry of Health, results of other research on health services in Indonesia, and patterns within the village census data provide fairly firm evidence that the distribution of health facilities, as well as other institutions, is not random. The distribution partly reflects government allocation policies and partly reflects a tendency of modern institutions to cluster together in developed areas of population concentration. This finding is not surprising, but it indicates the need to design a statistical analysis free from the assumption that facilities are distributed randomly with respect to mortality or its determinants.

Statistical methods

The problem of a non-random distribution of health facilities can be conceptualized as an issue of omitted variables. Features of a village make it attractive to some institutions and unattractive to others. If these factors are related to mortality but are excluded from the model, the estimated parameters will be biased. Including the factors directly is problematic in that they are potentially numerous, may differ across the institutions of interest, and may be difficult to conceptualize, let alone measure.

The general problem of unobserved confounding factors is well-known in the epidemiological literature. A common solution with retrospective data is the use of matched pairs, where one member of the pair serves as the case and one member of the pair is the control (Fleiss 1981). I use this approach, comparing survival outcomes for pairs of children from the same village. Because each member is from the same village, they are matched on village characteristics and so differences in their survival outcomes will not reflect unobserved characteristics that vary across villages but are constant within villages.

This strategy has also been developed in the econometric literature. Chamberlain (1980) formalized a method for eliminating bias from omitted variables in probability models. Chamberlain develops his argument with the linear regression case:

[1]

where each of N groups contributes T observations. The a_i are group-specific effects. If an individual contributes multiple observations, each 'group' is an individual and the a_is are individual effects. If the a_is are correlated with the x_{it}s and the a_is are not included in the equation then the parameters will be biased. In this case a regression of y on x, with dummy variables indicating membership group provides maximum likelihood estimates of the parameters in the equation (Chamberlain 1980).

The dummy variables solution does not extend to probability models.[6] Instead, Chamberlain suggested maximizing a conditional likelihood function. The likelihood function is conditioned on the sum of the y_{it}s:

[2]

When T=2 and the y_{it}s are binary one can maximize the likelihood with a logit specification. The sum over T of the y_{it}s must equal 0, 1, or 2. When the sum equals 0 or 2, y_{i1} and y_{i2} are identified given their sum. Within the likelihood function any term where the sum of the y_{it}s equals 0 or 2, will itself equal one and so will not contribute any information (Greene 1990:687).

The cases of interest, then, are when the y_is sum to one, so that the sum does not identify the values of y_{i1} and y_{i2}. For these pairs of observations one estimates the probability that:

[3]

Substituting the formula for logistic regression, the right side of the equation becomes:

[4]

6 Chamberlain (1980) showed that for several probability models, including the logit model, maximum likelihood estimates of parameters are biased when group-specific dummy variables are included.

where the a_is are the effects of being one of the two members of a particular group. The equation simplifies to:

[5]

Since $a_i=a_{i1}=a_{i2}$ for any group of two, the a_is disappear from the equation when one is subtracted from the other and the parameter estimates are no longer biased. The alternative is to estimate a standard, unconditional logistic regression:

[6]

where the a_is are not subtracted out and the Bs are biased.

One can test the hypothesis that the parameters obtained from maximizing the unconditional likelihood are inconsistent relative to the parameters obtained from maximizing the conditional likelihood (Maddala 1988: 435). The test statistic, which follows a χ^2 distribution, is a Hausman statistic, calculated as:

[7]

Chamberlain's approach provides a means of estimating the effects of independent variables on a dichotomous outcome variable when observations are grouped and group membership affects the outcome. The conditions for using Chamberlain's approach with logistic regression are that each group contains two members, that the outcomes of the members differ, and that explanatory variables vary between the members.

The problem in this analysis is to estimate the impact of measured group-level variables (access to health care within villages) on individual outcomes. Omitted group-level variables such as wealth or degree of remoteness are a potential source of bias. The data and analysis problems are similar to the circumstances under which Chamberlain recommends conditional maximum likelihood estimation with logistic regression. The outcome variable (death) is binary, the data are grouped at the village level, and independent variables vary within villages over time. Villages, however, have more than two members. If infants born in the same village are grouped into pairs of observations, Chamberlain's approach provides a means of eliminating bias from omitted variables. The use of pairs, matched on village residence, corresponds to the matched case-control designs common in the epidemiological literature.

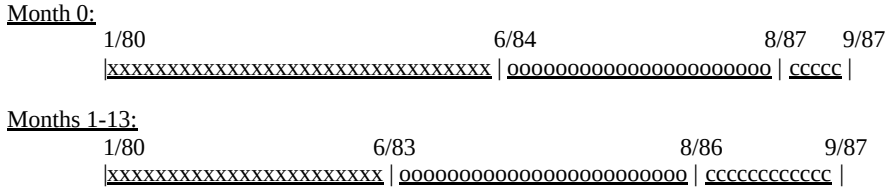
The process of creating matched pairs required several steps. In the first step births were separated into two cohorts: births before mid-1983 and births after mid-1983. Infants from the earlier cohort were matched to the 1983 community-level data, while infants from the later cohorts were matched to the 1986 data.

To provide pairs of infants within each village infants from the early cohort were randomly paired with infants from the later cohort. Because the factors that produce or

prevent a neonatal death may be quite different from those associated with a post-neonatal death, the matching procedure was performed twice to avoid matching neonatal deaths to post-neonatal deaths. First I coded each child according to whether it had died within the first month of life and, within villages, randomly matched children born between 1983 and mid-1984 with children born after mid-1984. The pairs were kept when one child died and the other survived. I repeated the steps with the children who survived the neonatal period, coding them according to whether they survived to 13 months of age.[7] Within each village infants born between 1980 and mid-1983 were randomly matched to infants born between mid-1983 and 13 months before September 1987, the interview date. Again, the pairs were kept when one infant died and the other survived. The matching was done without replacement, to guarantee that the resulting pairs were obtained randomly.

Infants should be matched to the community data so that the period for which they are exposed to the risk of death coincides roughly with the period to which the community data refers. The neonatal exposure period is only a month long, while the other period is one year long. Accordingly, the matching rules differ by exposure period. The diagram below depicts the matching rules.

Figure 1
Matching rules: individual observations to community-level data



xxx = births in this period matched to 1983 data
ooo = births in this period matched to 1986 data
ccc = censored

Two files of pairs of infants were constructed: one for neonates, and one for post-neonates plus the thirteenth month of life, hereafter referred to as the post-neonatal file. Each pair of infants serves as an observation, with the following characteristics: both infants were born in the same village, but in different time periods, and one infant had died in the specific period of exposure. The earlier infant was assigned the 1983 village characteristics, while the later infant was assigned the 1986 village characteristics.[8] For each observation (pair) I created a dependent variable measuring whether the early child died (zero) or the later child

[7] In choosing a cutoff for mortality after the neonatal period, it is necessary to consider the problem of censoring. The individual-level data were collected in September 1987. The analysis must be restricted to children born long enough before the survey to have had a chance to survive for the entire period under consideration. I chose to analyse survival to 13 months rather than to a later age or to 12 months because I can consider children born after the 1986 community data were collected and because a number of children were reported to have died in the thirteenth month of life: had I considered infant mortality they would have been excluded. If I analysed survival over a longer period, say from months one to 18, I could not consider children born after March 1986.

[8] The community data are available for two years but I analyse births from over an almost eight-year period. The community data measure inexactly the levels of facilities in existence during infants' survival experiences.

died (one). The independent variables are the differences in characteristics across the two pairs.

The model is a logistic regression of the odds that the later child died, yielding the log odds that the later child died rather than the earlier child, as a function of change in access to health services between time periods. If access to facilities improves survival chances, the chance that the later child died rather than the earlier child should decrease as access to facilities improves over time. The advantage of this approach is that the parameters are not biased by omitted fixed characteristics at the village level. The approach does not yield unbiased estimates, however, if changes in community characteristics are correlated with omitted village characteristics that are changing over time. For example, if changes in the number of government health clinics in a village between 1983 and 1986 are a response to planners' observations that mortality in the village is increasing, then the fixed-effects parameter estimates for health clinics will be biased.

A disadvantage of the approach is that the conditions on the data set limit the number of observations. For each village the size of the early cohort differs from the size of the later cohort, so that some infants are not paired and cannot be analysed. Additionally, pairs of which both members survived or both members died are dropped because they do not contribute to the estimation process (Fleiss 1980: 114; Chamberlain 1980). Because death is a relatively rare event, most of the dropped pairs were ones in which both children survived. However, 50 post-neonatal pairs and 43 neonatal pairs were rejected because both infants died. The process also means that certain villages do not contribute any pairs to the analysis file. This happens most frequently because there are some villages in which none of the 20 or so women interviewed in the DHS had lost an infant since 1980. Thus, villages with particularly low fertility or infant mortality are likely to be underrepresented. The women in the DHS sample gave birth to almost 13,000 children between 1980 and September, 1987. Using the pairing process described above we constructed an analysis file of 652 pairs of children (298 neonatal observations, 354 post-neonatal observations) from 269 villages. The small number of pairs limits the precision of the parameter estimates, but not their consistency.

The pairs provide a means of estimating the effect of community features on mortality risks, free of bias from omitted village-level characteristics. The alternative approach is to estimate the parameters of the community features from a data set of cross-sectional observations. The parameter estimates from the cross-sectional data set may be inconsistent because of the omitted village effects. If the data set of pairs is a subset of the cross-sectional data set a Hausman statistic can be constructed to test formally whether the cross-sectional estimates are inconsistent.

The effects of individual-level, family-level, and community-level variables were analysed, including those by which survival risks generally differ: first birth, sex, birth order, length of the preceding birth interval, and maternal education. The infants' birthdates were included to capture the time trend in mortality. Each variable's values are calculated as the difference in values between the two pairs of children: for example, maternal education is measured as the difference between the education of the mother of the early child and the mother of the late child.

The focus is on three community variables. The numbers of health workers and doctors in each village capture access to trained health personnel. The numbers of maternity clinics capture access to fixed-site health services. A measure of access to government health clinics is not included in the analysis. Unlike the 1986 data, the 1983 community-level data on availability of government clinics did not distinguish between health centres and subcentres; however, the 1986 data presented in Table 1 suggest that these facilities are located in different types of villages, and we know that the two types of facilities differ in terms of

quality and staffing levels. Because I did not want to combine the two types of facilities, I did not include measures of change in access to government clinics in the models.

The health services variables are of interest from a policy perspective. The Government of Indonesia invested considerable resources in the mid-1980s training health workers (USAID 1988): between 1984 and 1988 these workers' numbers increased dramatically. The size and direction of the effects of doctors, health workers, and maternity clinics indicate whether these investments have translated into reductions in mortality risk.

Changes in access to facilities were measured as changes in the number of facilities or personnel within a village. I experimented with other measures of accessibility, such as per capita availability, an indirect estimate of proximity, and measurements at various levels of aggregation (village or subdistrict). I rejected these measures because they are more difficult to interpret in the context of a model of differences and because the incorporation of population and land area into the measure of accessibility substantially increases the level of correlation across the facilities of interest. Unfortunately, no information was collected about the quality of the health services, so we are limited to analysing measures of availability. Frequency distributions for both levels of access and changes in access to facilities are presented in Tables 2 and 3. Table 2 shows that in the villages analysed, levels of maternity clinics increased between 1983 and 1986, while levels of health workers changed little and levels of doctors decreased. Table 3 shows that a considerable number of villages experienced a change in access to facilities and to personnel between 1983 and 1986.

Table 2
Levels of health infrastructure, 1983 and 1986 percentage distribution and mean

Variable	1983	1986
Maternity Clinics	%	%
0	71	71
1	21	16
2+	8	13
Mean	0.41	0.59
Doctor		
0	59	69
1-10	29	23
11+	12	8
Mean	3.9	3.0
Health worker		
0	32	42
1-10	55	47
11+	13	11
Mean	5.2	5.1

Based on the 269 villages that contributed observations to the pairs file

Table 3
Frequencies, change in community variables (percentage distribution)

Change 1983 to 1986	Doctors	Maternity clinics	Health workers
+3 or more	15.6	3.7	26.4
+2	4.5	4.5	8.2
+1	12.7	9.7	10.4

0	51.3	65.8	25.3
- 1	6.1	13.4	5.2
- 2	3.4	1.8	7.1
- 3 or more	6.4	1.1	17.4

Based on the 269 villages that contributed observations to the pairs file

Possibly the addition of the first health care provider to a village has a stronger impact on mortality than the addition of subsequent providers of that type. I tested for a differential impact by estimating a model that includes terms for whether any maternity clinics were available in the baseline period, 1983, and whether villages in which clinics were added already had established clinics. There were no villages in which the number of health workers or doctors increased from zero in 1983, so it was not possible to repeat the analysis for these provider types.

Researchers have often suggested that the impact of access to health facilities varies by level of education (Caldwell 1979; Rosenzweig and Schultz 1982; Caldwell, Reddy and Caldwell 1983; Al Kabir 1984). One argument suggests that education and access to services are substitutes: access to services is more beneficial to the infants of poorly-educated women than to the infants of well-educated women. Another argument posits that education and access to health services are complements: infants of educated women have more to gain from access to services than do the infants of uneducated women (Barrera 1990).

Both arguments are logical, and each may hold in different settings. The relationship between maternal education and access to facilities depends on how education affects use of health services, how use of services lowers the risk of death, and how education affects the ability of mothers to translate health service resources into lower risks for their babies. Education facilitates service use if educated women feel more competent interacting with health service personnel, producing a positive interaction between maternal levels of education and access to health services (Lindenbaum, Chakraborty, and Elias 1985). If health services lower mortality risks by changing women's behaviour, for example by persuading mothers to use oral rehydration therapy, and if educated women are better learners, the interaction between access to services and education will be positive. On the other hand, increasing service availability may benefit uneducated women more if these are the women for whom distance or congestion discourages service use. Similarly, if educated women already follow healthy child care practices, increasing service availability may benefit uneducated women more because there is greater scope for changes in their behaviour as services become more available.

The relationship between access to services and levels of education can be explored by interacting educational level with access to services. Models were estimated that included interactions between education and the health infrastructure variables, distinguishing between women who have completed at least a primary school education (seven or more years) and women who have less than a completed primary school education.[9]

For each pair, I interacted the education of the early child's mother with the level of facilities in 1983 and the education of the later child's mother with the level of facilities in 1986, then differenced the two products. The coefficient of the interaction term multiplied by the value of the interaction term for a pair of children yields a value that adjusts the main effect of a change in access to facilities for the absolute and relative levels of maternal

[9] I estimated four separate models, each of which included an interaction term between maternal education and one of the health service variables and so avoided estimating a large model in which the variables were highly correlated. Nevertheless, correlations between levels of facilities and the interaction of levels of facilities with maternal education are fairly high, between 0.4 and 0.8.

education within the pair, so that the effect of adding a health centre is different when both mothers are educated from when neither is educated.

Results

The first issue to resolve is whether neonatal and postneonatal observations can be pooled. The issue can be explicitly tested by comparing the likelihood statistics from a model applied to a pooled data set with the sum of the likelihood statistics from separate models (Table 4). Adding these two likelihoods is equivalent to estimating a model with the pooled data set that includes an interaction term between the age interval and each of the independent variables, so that the effect of each independent variable can vary with the age of the child. The test statistic is insignificant: one cannot reject the null hypothesis that the effects of changes in the variables on the neonatal mortality risks are the same as for post-neonatal risks. This result contrasts with the accepted wisdom that the determinants of mortality change over the first year of life. Possibly the number of observations in this analysis is too small for differences in the magnitude of effects across age intervals to translate into statistically significant differences in the comparative fit of the two models.

Table 4
Fixed-effects analysis of mortality determinants, neonatal and post-neonatal age intervals, Indonesia, 1987 DHS data

Age interval	Variable	Coefficient	t Statistic
Neonates	Birthdate	-.00359	0.534
N=298	Female	-.47301	2.399
	Previous interval	-.01258	2.679
	Birth order	.04587	1.002
	First birth	-.26009	0.856
	Maternal education	-.04986	1.302
	Maternity clinic	.08521	0.728
	Health worker	-.00045	0.026
LL= -181.09	Doctor	-.01714	0.965
Post-neonates	Birthdate	-.00099	0.147
N=354	Female	-.09315	0.594
	Previous interval	-.01178	2.651
	Birth order	.07331	1.726
	First birth	-.32389	1.198
	Maternal education	-.13602	3.637
	Maternity clinic	-.15820	1.805
	Health worker	.01972	1.876
LL= -227.71	Doctor	-.01628	1.446
Sum LL= -408.79	Pooled LL= -416.93	Difference in LL= 8.14, 10 DF	

Some of the coefficients do exhibit different effects across the two age intervals. The differences are broadly consistent with other analyses suggesting that as a child ages, socio-economic factors gradually replace biomedical factors as the most important determinants of mortality (DaVanzo, Butz and Habicht 1983). Specifically, the coefficient on sex of the child is much larger for the neonatal pairs than for the post-neonatal pairs, the opposite pattern holds for maternal education, and the community variables have larger and more significant effects for post-neonatal than neonatal mortality.

The preferred model is the one in which neonatal and post-neonatal observations are pooled (Table 5). The parameters of the model reveal the effects of access to health infrastructure and personnel on the relative risk of mortality. By comparing the fixed effects model with the alternative (cross-sectional) model, one can determine the degree to which results are affected by failure to control for omitted variable effects.

To test formally for differences between a fixed effects model and a cross-sectional model, one must estimate a standard logit model, with explanatory variables identical to those included in the fixed effects model (Maddala 1988:435). The construction of the data set for the cross-sectional model should parallel that for the fixed effects model. Accordingly, I constructed a pooled file of neonatal and post-neonatal observations, in which infants were matched to the community data as depicted in Figure 1. This file is equivalent to the file of pairs constructed for the fixed effects models.[10]

The results from the fixed effects model and the cross-sectional model are presented in Table 5. In both models individual and family-level mortality determinants exert relatively predictable effects on the odds of death, and the effects are of comparable magnitude.

Table 5
Fixed-effects and cross-sectional estimates of mortality determinants, pooled neonatal and post-neonatal observations, Indonesia, 1980-1987

Variable	Fixed Effects		Cross Section		Hausman
	Coefficient	t	Coefficient	t	
Birth-date	-.00537	2.99	-.00500	3.44	0.09
Female	-.25504	2.13	-.24458	3.46	0.01
Previous interval	-.01278	4.00	-.01857	7.47	8.34
Birth order	.05312	1.74	.05159	3.01	0.11
First birth	-.32562	1.64	-.37717	3.02	0.004
Maternal education	-.07083	3.33	-.06738	6.46	0.04
Maternity clinic	-.15762	2.31	-.04403	1.08	4.32
Health worker	.01358	1.66	-.00415	1.08	6.14
Doctor	-.01695	1.90	.00281	0.56	6.92
Constant			2.8212	1.92	
Log likelihood	-416.93		-3594.77		23.4
N	652		24190		9 DF

The fixed effects estimates indicate that a decline in mortality risks has occurred over time in Indonesia. Of children born one month apart, the later child's odds of death are 0.5 per cent lower than the earlier child's. Male children have about 29 per cent higher odds of death than female children.[11] The coefficients on previous interval length, first births, and

[10] Most children appear in this pooled cross-sectional file twice, once as a neonatal observation and once as a post-neonatal observation. This repetition of observation parallels discrete time hazards models, which are commonly used to study demographic phenomena (Trussell and Hammerslough 1983; Martin et al. 1983; Foster et al. 1986). To the extent that the mortality risks of a child are independent across age intervals, the repeated observations are not a problem. If mortality risks are not independent the estimated standard errors will be incorrect.

[11] This excess risk is consistent with the ratio of the male to female infant mortality rate calculated for all births between 1977 and 1987, which is 1.28 (Sullivan, Bicego and Rutstein 1990). Males were also found to have considerably higher mortality risks than females in the World Fertility Survey of Java and Bali (Martin et al. 1983).

birth order must be interpreted together; first births must be compared to a child of a certain birth order, with a certain preceding interval length. First births face mortality risks comparable to those of second-order births with prior-interval lengths of 34 months or more. Each year of maternal education decreases the odds of death by about seven per cent, comparable to the effects documented by Cleland and van Ginneken (1988) in a major review of the relationship between maternal education and infant mortality.

If increases in the availability of health care decrease mortality, the parameters of the community-level variables should be negative. The coefficients on maternity clinics and doctors are negative and significant ($p<.03$ and $p<.06$, respectively). Within a village an increase of one maternity clinic decreases the odds of death of an infant with access to that clinic by about 15 per cent, relative to the infant born before the clinic existed. The impact of additional doctors is much smaller. An additional doctor decreases an infant's odds of death by around 1.7 per cent.

Contrary to expectations, the effect of additional health workers on relative mortality risks is slightly positive. An infant born after health workers are added to a village has about 1.3 per cent greater odds of death than an infant born before the addition of health workers. The effect is significant at the 10 per cent level.

The effects of the community variables in the model estimated with the pooled cross-sectional data set are very different: none of the health service variables significantly affects mortality risks. In the cross-sectional model the coefficient on maternity clinics shrinks to about one quarter of its size in the model of differences. The cross-sectional estimate of the coefficient on health workers is negative, whereas it is positive in the model of differences; the reverse is true of the coefficient on doctors.

It is possible to test the hypothesis that the parameters from the pooled cross-section are consistent, with a Hausman statistic. The Hausman statistic follows a χ^2 distribution; the statistic is 23.4, which is significant at the one per cent level of confidence. The hypothesis that the estimates from the pooled cross-sectional data are consistent is rejected.

It is possible also to determine which parameters are particularly inconsistent by constructing individual Hausman statistics for each parameter. The variables for which the individual Hausman tests are significant are birth interval lengths, maternity clinics, health workers, and doctors. The significance of the Hausman statistic for these variables implies that fixed, omitted characteristics of the village are correlated both with mortality and with the distributions of birth interval lengths, maternity clinics, health workers, and doctors. Eliminating these fixed factors from the model produces markedly more consistent estimates of the effects of these characteristics on mortality risks.

The significance of the overall Hausman statistic means that the effects of community characteristics on infants' survival chances as estimated in a standard logit analysis are biased. To what extent would interpretation of the pooled cross-sectional results generate misleading conclusions? With the exception of previous interval lengths, the effects of individual and family level determinants are consistent across the two models. The coefficients on all the health service variables from the pooled cross-sectional results do generate misleading interpretations.

I also estimated a model that included terms testing for an additional impact from adding a maternity clinic to a village in which none had existed, over and above the effect of adding more clinics to villages that already had some. This model indicates that adding a maternity clinic to a village in which none was present before does have a stronger impact on mortality than adding clinics to villages in which they are already present, but the effect is not significant (results not shown).

None of the interaction terms between education and health services or personnel is significant, probably because correlations between the interaction terms and the main effects are somewhat high, even after dichotomizing educational levels. Including the interaction

terms does not improve the fit of the models (statistical results not shown). Although the interaction terms are not significant, the signs of the terms are interesting. The addition of maternity clinics reduces the risk of death more for infants of women with at least a primary level of education than for infants of women with lower levels of education. Results are similar for access to doctors' services, but the differential impact is quite small.

Discussion

The potential for maternity clinics to reduce mortality risks is clear from a theoretical standpoint. Maternity clinics provide services to women while they are pregnant, when they give birth, and after the birth in the form of baby care. These clinics concentrate on services that directly affect foetal development, birth, and infant health, so they are well-positioned to affect infant mortality. The services provided by health workers and doctors are much more general. The large effect of maternity clinics in reducing mortality risks suggests that Ministry of Health effort in the 1980s to increase access to maternal and child health services, in part by increasing the number of trained midwives, has paid off. In the 1990s major programs have been implemented to assign midwives directly to villages rather than to clinics. As data become available it will be interesting to evaluate the effect of these programs on infant mortality.

The effect of adding maternity clinics appears to be particularly strong in villages in which no clinics were present before, and for the infants of women with at least a primary school education. Possibly modern obstetric services may be more appealing to educated women, who view themselves as middle class, than to uneducated, more 'traditional' women who prefer the services of traditional midwives, and the accompanying birth rituals traditional midwives perform. Lindenbaum et al. (1985) noted that in Bangladesh education tends to change women's ideas about their status and consequently about what behaviour is appropriate. Additionally, to the extent that education and income are correlated, educated women are probably more able to pay for the services of maternity clinics than are uneducated women. After childbirth, educated women may be more capable than uneducated women of converting the instructions received at maternity clinics into healthy practices.

The effects of increasing access to doctors are small, but encouraging: the presence of doctors does lower mortality risks. A review of available literature suggests that Indonesians frequently use private services as a source of health care (Haliman and Williams 1983; Berman et al. 1989; Linnan 1990). The results of this analysis suggest that the services are effective.

Increases in the availability of health workers appear to raise mortality risks a small, but marginally significant, amount. Although there seems no reason why health workers should actually raise mortality risks, their presence was not expected to substantially lower them. First, health workers are widely available as a source of care in Indonesia: over 70 per cent of the DHS villages have at least one, and 21 per cent of DHS villages have more than ten. Increasing the numbers of health workers probably does not greatly increase access to their services. Secondly, the category is vague, encompassing people with varied levels of training, probably ranging from graduates of the Health Worker Training Schools of the 1960s, to recent graduates of Paramedical Academies.[12] While some health workers probably do positively affect survival chances, many other poorly-trained ones probably have no effect.

[12] Berman et al. (1987) describe the various sources of informal modern care available in Indonesia: volunteer health workers, unlicensed injectors, paramedical workers from health centres and subcentres, and others. All of these workers are probably encompassed by this variable.

Possibly their effect is harmful if their presence delays people from seeking better, but more expensive or more distant sources of care.

The results presented above strongly suggest that increases in access to health care and particularly to maternal and child health services decrease mortality risks for Indonesian infants. Unfortunately, the community-level data on health care are not sufficiently detailed to support the formulation of specific policy recommendations.

The data have several limitations. First, it is impossible to isolate the roles of public and private services. It is likely that both public and private services are included in the maternity clinic variable (see Footnote 5). Although the measures of doctors and health workers pick up private practices, some (but not all) of these practices exist because the government stations newly trained health personnel in government clinics, often in areas where they would not otherwise choose to live. Most graduates of Indonesian medical schools, midwifery academies, etc. are required to serve in a government post for several years before they are allowed to practise privately as their sole job (Berman and Sakai 1986; USAID 1988). While in these posts, such personnel then open private practices in the areas as well. Consequently, the distribution of public services partly determines the distribution of private services: if a village did not have a health centre, it probably would not have a doctor's practice either. It does seem clear that government expenditures on training programs for health personnel have been beneficial and that the existence and distribution of private services must be credited partly to public programs.

A second limitation of data is that we know almost nothing about the training levels, services provided, or quality of the health personnel and facilities we are analysing. The lack of data on training levels makes it particularly difficult to interpret the finding that mortality risks increase with the addition of health workers. Also, while the addition of a maternity clinic substantially reduces infant mortality risks, it is not clear what levels of services or quality of care account for this impact.

Conclusions

Analysis of the effects of access to health care on mortality contributes both to policy makers' perceptions of program impacts and to researchers' understanding of the determinants of demographic outcomes. Use of national-level data is appealing in that representative data provide insights into the functioning of the existing health system. On the other hand, the non-experimental nature of national-level data complicates the analysis considerably. If the distribution of health care is not random with respect to mortality or its determinants, standard estimates of program impacts will be biased. Policies of the Ministry of Health, literature on health services in Indonesia, and exploratory data analysis with censuses of village infrastructure all suggest that the distribution of health services in Indonesia is certainly not random. The processes that generate the distribution of health services, however, appear complex and difficult to capture with available data.

Rather than trying to construct and include variables that control for these processes, this analysis employed a fixed-effects approach that takes advantage of data from two points in time. In this approach changes within villages in infant mortality risks are related to changes within villages in access to private facilities. Fixed characteristics of villages that might affect both access to facilities and mortality risks are differenced out of the equation and so do not bias parameter estimates.

The fixed-effects approach yields considerably different results from those of a standard cross-sectional logit. A formal test for differences between the two models concludes that the parameter estimates of the cross-sectional model are biased. The cross-sectional estimates also turn out to be misleading. Comparison of the two models confirms the importance of designing the analysis so as to account for non-random allocation of health services.

The results of the fixed-effects model suggest that health services do significantly alter infant mortality risks. In particular, adding maternity clinics and doctors to villages reduces the risk of infant mortality.

The results of this analysis should be of interest to several audiences. From a policy perspective the analysis indicates that efforts to improve health care have lowered individual risks of mortality. From a theoretical perspective, the results serve as an empirical justification for models of infant mortality that include community-level determinants. From a methodological perspective, the statistical approach developed here should be applicable to other data sets.

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Health Transition Review 5, 1995, 163 - 190

Intra-urban differentials in child health*

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Abstract

This paper uses DHS data on the urban populations of Ghana, Egypt, Brazil and Thailand to investigate the effect of poverty and environmental conditions on diarrhoeal disease, nutritional status and survival among children. Differentials in health are moderate in urban Ghana, whereas in Egypt and Brazil reductions in morbidity and, above all, mortality have accrued largely to the better off. In Thailand, the poor fare better and inequalities in mortality are no larger than those in morbidity. Children's health is affected by environmental conditions as well as by their family's socio-economic status.

By about the turn of the century, for the first time in history most of humanity will be living in urban settlements (UN 1989). In about 2015, this will also become true of the developing world's population. As recently as 1970, only about a quarter of the population of the developing world lived in towns and cities; it has long been realized that, in contrast to the historical experience of the West, those living in the urban sector of developing countries tend to enjoy better health than rural residents (Johnson 1964). Equally, it is well-established that the health of the urban poor may be as bad as that of rural residents, or worse (Basta 1977). As this has become widely recognized, there has been an explosion of research interest in inequalities in health within developing-country cities: a recent review identified over one hundred studies concerned with intra-urban differentials in health and mortality (Harpham and Stephens 1991).

Much of the recent research into inequalities in urban health consists of studies conducted in a single country or city.[1] This study, in contrast, adopts a comparative approach to the investigation of differentials in health within the urban sector of national populations. It

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* Dedicated to the memory of Nigel Crook, friend and colleague, for the inspiration provided by his research and his commitment to the struggle for health of the urban poor. This research was undertaken as part of a larger study, *Environment and Health in Developing Countries: An Analysis of Intra-Urban Differentials* (Stephens et al. 1994), funded by the Environment and Policy Department of the UK Overseas Development Administration. Mick Pearce undertook much of the data processing involved with his usual efficiency. We thank our collaborators for their contribution to this part of the wider project, including Carolyn Stephens (Principal Investigator), Marco Akerman, Sebastian Avle, Paulo Borlina Maia, Sandy Cairncross, Paulo Campanario, Trudy Harpham, Ben Doe and Doris Tetteh.

[1] The literature on Brazil is particularly extensive. Within urban areas large socio-economic differentials have been found in child mortality (e.g. de Carvalho and Wood 1978), nutritional status (e.g. Monteiro et al. 1986) and morbidity (e.g. Benicio et al. 1986). Furthermore, differentials of a comparable size exist between squatter settlements and organized housing areas (e.g. Guimaraes and Fischmann 1985).

is based on secondary analysis of Demographic and Health Surveys (DHS) data collected during the late 1980s in Ghana, Egypt, Brazil and Thailand.[2]

The first objective of the research is to document and compare the scale of socio-economic differentials in child mortality, morbidity and anthropometry within the urban sector of several less developed countries. Second, we investigate the extent to which such differentials in health can be related to the environmental conditions in which different socio-economic groups live. This issue, and in particular the effect of water supplies and sanitation on child health, has attracted the interest of public health engineers, epidemiologists, demographers and other public health specialists. There is a large literature on it,[3] although most studies have been conducted in rural areas and may not apply to urban settings (Esrey and Sommerfelt 1991). The findings suggest that increases in the quantity of water used for personal and domestic hygiene have more effect on health than improvements in water quality and that the provision of a water supply to a dwelling is the crucial step in the improvement of services that leads to substantial increases in water use. Improved sanitation, on the other hand, probably has a particularly strong effect on infection with intestinal parasites. As such infections are rarely fatal, the type of toilet facility used may be associated more closely with morbidity and nutritional status than with mortality.

Improvements in the urban environment appear to have played a major role in the decline in mortality in European cities in the nineteenth century (e.g. Preston and van de Walle 1978; Szreter 1988). Many studies of urban populations in the contemporary developing world have also found that environmental factors are strongly associated with child mortality (e.g. Tek•e and Shorter 1984; Merrick 1985; Victora et al. 1988; Monteiro and Benicio 1989; Crook and Malaker 1992). Despite this evidence, other studies have found that water and sanitation have no effect on mortality after the socio-economic status of households is allowed for (e.g. UN 1985; Pickering et al. 1987). Undoubtedly, one reason for such confused and contradictory findings is the practical and ethical difficulties involved in conducting controlled trials of environmental interventions using experimental designs (Cairncross 1990). In this field, both longitudinal and cross-sectional investigations are subject to methodological problems that could explain the contrasting findings of different studies (Blum and Feachem 1983). Both measurement errors and imperfect study designs are probably important. For example, the use of crude indicators that fail to measure accurately either environmental exposure or outcomes may explain some negative findings, while residual confounding with socio-economic status or hygiene consciousness, even after attempts to control for this, could produce a false impression of a positive effect (Cairncross 1990).

It also seems likely that the influence of the urban environment on health is complex, and conditioned by a wide range of other characteristics and behaviours. For example, the effect of improved water and toilet facilities on child health may vary between individuals and populations depending on parental education (Stephens 1984; Esrey and Habicht 1988), child feeding practices (Butz, Habicht and Da Vanzo 1984), or income. In addition, households with better facilities may obtain few health benefits if the level of environmental contamination in the community is high (Feachem et al. 1983). Thus, differences in environmental conditions between neighbourhoods may be associated with larger differentials

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2 Details of the questionnaires, sample design and field procedures used in these surveys are published in the survey reports (Arruda et al. 1987; Chayovan, Kamnuansilpa and Knodel 1988; Abdel-Aziz Sayed et al. 1989; Ghana 1989).

3 A number of good reviews of this field which have been published recently contain comprehensive references to the primary research literature. They include Esrey, Feachem and Hughes (1985), Cairncross (1990), Huttly (1990) and Esrey et al. (1991).

in health than differences in household-level facilities (Koopman, Fajardo and Bertrand 1981; Bapat and Crook 1984; Pickering et al. 1987; Bateman and Smith 1991).

A general-purpose, single-round household survey such as those conducted by the DHS can be used to improve our understanding of only some of these issues. It is not a suitable tool for establishing definitively the degree of effect that various environmental interventions can have on health. It is also of limited use for unravelling the behavioural mechanisms that mediate between service provision and improved health. Instead, we focus several related questions of relevance to urban development policy.

First, because the DHS has conducted comparable surveys in a series of countries at differing levels of development, it can be used to investigate whether the relationship between the urban environment and child health in urban areas differs systematically with the overall standard of living in a population. If environmental services have a significant effect on mortality that is separable from the influence of household socio-economic status, differentials in urban child health should be largest at intermediate levels of provision (Huttly 1990). Where the overwhelming majority of the population either has, or lacks, access to basic services, smaller differentials would be expected. If, on the other hand, the apparent influence of environmental factors on health largely reflects residual confounding with socio-economic status, the degree of inequality in associated health outcomes may remain more or less constant across countries at different levels of development.

A second characteristic of the DHS is that it collects information on mortality, the nutritional status of children and diarrhoea prevalence. Thus, it has potential for exploring the relationship between the pattern of differentials in each of these health outcomes by socio-economic status and aspects of the urban environment. Relationships between morbidity, growth faltering and child mortality are complex and vary between populations. They can nevertheless be seen as successive stages of ill-health (Mosley and Chen 1984). Because the influence of socio-economic status on exposure to infection is likely to be compounded by different care and use of health services, differentials in long-term outcomes, such as stunting and mortality, tend to be larger than those in outcomes related to acute infection, such as diarrhoea prevalence and wasting. However, if environmental factors have a causal effect on infection, then in comparison with long-term outcomes, differentials in acute ill-health by environmental measures should be larger and more consistent than those by socio-economic measures.

Third, many studies of urban child health have been conducted in only one or a few communities in a country. In contrast, the DHS uses clustered sample designs to collect data that represent the entire range of urban environments in the countries surveyed. The surveys can be used, therefore, to investigate the extent to which health differentials associated with water and sanitation distinguish small geographical areas within which children share related risks of infection, rather than differences between households related to their facilities. Household facilities can be viewed as intermediate variables that are shaped by both demand (as a function of household income and education) and supply (as measured by whether neighbouring households have adequate facilities). If the environment of the neighbourhood affects health after controlling for the socio-economic status of the household, supply of services is clearly important. If conditions in the cluster remain important after further controlling for household facilities, this suggests that young children are at risk from the extra-household environment and that there are significant consequent benefits to other households from partial provision of services.

Data and methods

Several often conflicting criteria influenced the decision to base the research on Ghana, Egypt, Brazil and Thailand (see Table 1). They include the size of the urban sample in each DHS survey, the amount of information collected on child health, our desire to investigate populations with differing levels of mortality from diverse regions of the world and whether the country has granted permission for use of its data in comparative research. We necessarily follow the DHS program in accepting local definitions of an urban area in each country. This approach is most problematic in Thailand where the DHS classified only officially designated municipalities as urban; this administrative definition excludes some areas that have acquired urban characteristics recently. If allowance is made for this, about 22 per cent of the population live in urban areas, compared with 18 per cent according to the DHS results (UN 1992). Brazil is included in the analysis, despite the fact that the DHS survey did not collect anthropometric data in most of the country, partly because it was the location of a linked field study with complementary objectives (Stephens et al. 1994). Unfortunately, very poor countries and those with a very high mortality rate under age five tend to be characterized by low levels of urbanization. No such country participated in Phase I of the DHS program and collected data from a large enough urban sample to be included in this study. According to UNICEF's (1993) classification, the under-five mortality rate is high in Ghana and Egypt and moderate in Brazil and Thailand. Very high mortality countries are those where the rate exceeds 140 per thousand. Thus, our results do not extend to an examination of urban health at its worst.

Table 1
Countries and surveys included in the study

Country	GNP per capita (US$ - 1991)	National U5MR - 1991 (per 1000)	Urban U5MR - DHS (per 1000)	Survey date	Urban sample (women)
Ghana	400	137	122	1988	1523
Egypt	610	85	69	1988-9	4409
Brazil	2940	67	67	1986	4514
Thailand	1570	33	27	1987	2423

Sources: GNP: World Bank (1993); National U5MR: UNICEF (1993).

Note: U5MR is mortality rate under age 5

The DHS surveys were undertaken among all women of childbearing age (15 to 49 years) in Ghana and Brazil but only ever-married women in Egypt and Thailand. The core questionnaire includes a detailed birth history from which can be calculated life table measures of the probability of death in a range of age intervals. To minimize misclassification biases arising from changes in environmental and socio-economic conditions between the birth of children and time of interview, all the estimates come from period life tables based on children's experience during the five years immediately before the survey.[4] To reduce sampling errors, all these are smoothed by fitting two-parameter relational model life tables in conjunction with the estimation of the effects of the explanatory variables by logistic regression. The procedure used was proposed first by Boulier and Paqueo (1988) and is

[4] Because of our concern with environmental conditions, all our analyses exclude the small number of women who were visiting the household where they were interviewed. In all four countries, about 80 to 90 per cent of residents have been living in the same area for at least five years.

discussed as Method IIIc in Trussell and Preston's (1982) investigation of methods for estimating the covariates of childhood mortality. One reservation about the method expressed in these papers is that it is difficult to distinguish variation in the 'slope' of mortality from variation in the time trend in mortality when analysing data on a sample of children born over a lengthy period of time. This issue is of no concern in this application as we use the approach to model period life tables. The standard life table used is a version of the Ewbank et al. (1983) standard that has been extended to include a measure of neonatal mortality (Blacker, Hill and Timaeus 1985) and the model is fitted to the probabilities of dying by ages one month, one year, five years, 10 years and 15 years.

The morbidity data considered here are based on mothers' reports about diarrhoea and, in particular, on the period prevalence of diarrhoea during the last week in Egypt and a two-week period elsewhere.[5] The surveys of Ghana, Egypt and Thailand collected anthropometric data on the heights and weights of children aged between three months and three years. These data are used to study differentials in the prevalence of moderate and severe stunting (low height for age), as a measure of accumulated health deficits due to infection and inadequate nutrition, and wasting (low weight for height), as a measure of more acute ill-health, reflecting illness and inadequate nutrition recently.[6] Where appropriate, we model the determinants of diarrhoeal disease and malnutrition using logistic regression and present fitted estimates of their prevalence.

Apart from the presentation of detailed estimates of mortality by age, the analysis focuses on children aged between six months and three years. Whereas maternal antibodies provide younger children with some protection from infections, this age group is particularly vulnerable to infectious disease linked to environmental conditions. In addition, use of it circumvents some of the reporting errors that can bias outcome measures for more conventional age groupings, including the rounding of ages at death to one year.

Most DHS surveys have not attempted to collect information about income directly. Instead, respondents were asked about their and their husbands' occupations and levels of schooling and about the consumer durables owned by the household. This information is used to divide families into four ranked socio-economic groups of approximately the same size. Somewhat different variables and weights are used to construct this index in the four countries, reflecting the differing conditions of their populations (see Appendix).

The information about environmental conditions collected in the core questionnaire covers source of drinking water supply[7], toilet facilities and, except in Brazil, data on the materials used to construct dwellings . These data are used both to examine the association between the facilities available to the household and child health, and to divide families into four approximately equal-sized groups according to environmental conditions in the sampling cluster where the household is located (see Appendix). This index allows us to examine the association between the environmental characteristics of the neighbourhood where children live and their health.

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5 Point prevalence data for the last 24 hours are also available. They follow broadly similar patterns and should be reported more accurately but estimates for the urban children are affected badly by sampling errors.

6 Stunted and wasted children are defined as those falling more than two standard deviations below the NCHS/CDC reference standards (WHO 1983). Exploratory analyses using mean Z-scores as an alternative outcome measure yielded very similar patterns of differentials.

7 The source of drinking water indicator yielded by the DHS questionnaire both conflates and imperfectly measures the quantity of water used by households and its quality. Unfortunately, no information is available about water purity or the frequency of interruptions to supply.

In any study of child health and mortality in the developing world, the quality of the data being analysed is open to question. While DHS surveys are conducted to high standards, several potential problems need to be borne in mind when interpreting the results of this study. First, fertility surveys are designed to yield data on the children of women in households but not on orphans or 'street children'; thus, these results fail to reflect the health of some of the most disadvantaged children in the developing world. Second, sampling frames for urban areas in developing countries rapidly become out-of-date and commonly omit newly-settled squatter camps. The relatively high standard of facilities reported in Accra, compared with the conditions identified elsewhere (Stephens et al. 1994), suggest that this may be a problem in at least the Ghana DHS.

A third major data quality issue is reporting and measurement errors. Exact dates of birth may have been forgotten, reported ages at death of children are often rounded to complete years and systematic biases can arise in the measurement of heights and weights. Recall errors are more serious in Ghana than in the other surveys and the data for Brazil seem highly accurate (IRD 1990).[8] Non-response may somewhat affect the representativeness of the anthropometric data. These measures were obtained from only 92 per cent of eligible children in Thailand, 84 per cent in Egypt and 82 per cent in Ghana. No major response biases are evident, though the poor tend to be slightly under-represented. Finally, while nearly all the mothers answered the questions about diarrhoea in their children, respondents' interpretation of these questions almost certainly varies across the four countries and probably also differs according to the level of education of the women and their exposure to the modern health sector (Murray and Chen 1992; van Ginneken 1993).

Conditions in urban areas

This section describes the socio-economic characteristics of the population and environmental conditions in the urban sector of each of the four countries and discusses the association between families' socio-economic status and housing conditions.

Ghana is a low-income country (World Bank 1993). Some 34 per cent of the population live in urban areas (UN 1992). Two thirds of women in Accra and just over half those in the other urban areas are literate, while a fifth in Accra and 10 per cent in other areas have secondary education. Although Ghana's urban population is the poorest and worst housed of the four considered in this study, most urban dwellers live in fairly soundly constructed dwellings and have access to some basic services. Conditions in Greater Accra are better than elsewhere and all of the quarter of the urban clusters with the worst environmental conditions are located outside Greater Accra.

In Accra, a quarter of women of childbearing age live in dwellings with a water-closet (WC); in other urban areas, this proportion is 13 per cent. While many urban households have a pit latrine, 13 per cent of women lack access to any facility. In Accra, in the areas surveyed by the DHS, access to piped water is universal and over half the women have water piped into their home. In the other urban areas, only 60 per cent of women have access to piped water and only a quarter to a supply within the dwelling. Few urban households still have earth or mud floors or thatched roofs. In urban areas outside Accra, however, 41 per cent of women live in dwellings constructed with earth or burnt brick walls.

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[8] Even in Ghana, event reporting seems to have been fairly complete for the 15 years before the survey and both a month and year of birth were reported for about 90 per cent of children born in the last five years. However, rounding of ages at death of older infants up to one year may lead the uncorrected infant mortality rate to be about five percentage points too low (IRD 1990).

Egypt is a low-income country but is approaching 'lower-middle income' status (World Bank 1993). Some 44 per cent of the country's population now live in urban areas (UN 1992). Around 50 per cent of the women are literate, which is a lower proportion than in Ghana, but over 40 per cent of this group have been to secondary school. A high proportion of women have access to basic water supply and sanitation services. According to the survey, practically all urban households have access to a piped water supply and 84 per cent of women have a tap in their dwelling. In Cairo, over half the ever-married women aged 15 to 49 years live in dwellings with a modern WC, though this proportion is lower in Alexandria (48 per cent) and other urban areas (35 per cent). Those households without a WC nearly all have pour flush toilets and 70 per cent of these are attached to a public sewer. Very few women in Cairo live in dwellings that have poor quality (earth or wooden) floors but the proportion is higher in Alexandria and rises to a fifth in other urban areas. Of the quarter of clusters identified as having the worst environmental conditions, only one is located in Cairo.

Brazil is classified as an upper-middle income country by the World Bank (1993) and, according to the DHS data, this is reflected in living conditions in its urban areas. The country is now well on the way to providing basic water and sanitation facilities for its urban dwellers, who make up about 75 per cent of the country's total population (UN 1992). While only a third of women are educated to secondary level, over 90 per cent are literate and half read a newspaper at least once a week.

In Brazil's major cities, nearly two thirds of women live in dwellings that are equipped with a WC. In other urban areas, this proportion is just under 50 per cent. Nevertheless, while 22 per cent of other women have a proper septic tank, about a quarter of women live in households that lack adequate toilet facilities. Over 90 per cent of urban households have access to piped water and about 80 per cent of women have a tap in their dwelling. Of the quarter of the clusters with the best environmental conditions, only one is in the deprived North-East region of the country.

Thailand is a lower-middle income country with a rapidly growing economy (World Bank 1993). Only 18 per cent of ever-married women live in either the only major city, Bangkok, or in other urban areas (see p. 166). In Thailand, 95 per cent of urban women are literate, although 29 per cent of this group say that they can read only with difficulty. Although gross national product per capita in Thailand is lower than in Brazil, the living conditions of the urban poor are at least as satisfactory. Nearly all urban households have access to an electricity supply and an adequate toilet facility. The proportion with a WC is higher in Bangkok (16 per cent) than in other urban areas (6 per cent); most other households have a toilet that drains into a tank. In addition, the homes of 90 per cent of the women in Bangkok and 70 per cent of other urban women have an individual piped water supply. Nevertheless, 18 per cent of women drink bottled water and 12 per cent rainwater. Outside Bangkok, 19 per cent of urban women obtain their drinking water from wells.

Table 2 examines the proportions of women living in dwellings with water piped into them and with a WC according to the four-way socio-economic classification. Access to environmental services is clearly lowest in Ghana. Only 36 per cent of urban women have a domestic piped water supply, compared with about 80 per cent elsewhere. Moreover, fewer of the best-off quarter of women in Ghana have piped water in their dwelling than of the poorest quarter of the population in the other three countries. While the proportion of the urban population with a WC is even lower in Thailand than Ghana, this reflects heavy reliance on septic tanks. Only 10 per cent of the poorest quarter of women in Thailand live in dwellings with neither a WC nor a toilet connected to a tank. In both Egypt and Brazil about half the women living in towns and cities have a WC. Provision is worse for the poor in Egypt than in Brazil.

Table 2
Access to environmental services by socio-economic status.

Socio-economic status	Ghana	Egypt	Brazil	Thailand
Women with a piped water supply within the dwelling (%)				
1 - Low	18.1	66.2	64.1	73.2
2	26.3	82.4	76.7	79.4
3	39.9	91.8	89.2	86.3
4 - High	57.8	98.1	97.2	92.5
Overall	36.1	84.3	80.6	82.8
Gini Coefficient	0.23	0.08	0.09	0.05
Women with a WC (%)				
1 - Low	6.1	16.3	36.8	2.6
2	8.3	35.8	44.8	5.1
3	16.9	56.4	64.0	10.4
4 - High	34.1	85.6	76.4	29.5
Overall	17.1	48.0	54.0	11.9
Gini Coefficient	0.35	0.29	0.16	0.45

Table 2 provides some insight into the degree of socio-economic inequality in access to environmental services in these four countries. As the four socio-economic groups considered here are defined to be approximately the same size, inequality between them can be summarized by Gini Coefficients.[9] These coefficients confirm, first, that inequality in access to adequate toilet facilities is greater than that in access to water supplies and, second, that social inequalities in access to basic environmental services are greater in Ghana than in the three more developed countries. The Gini Coefficient for access to either a WC or toilet with a tank in Thailand is just 0.02. Together with the coefficient for access to an individual piped water supply this suggests that there is greater equity in access to water and sanitation services in Thailand than in either Brazil or Egypt.

Even in Ghana, socio-economic status and housing conditions are not very closely related. Some relatively affluent families live in very poor housing and some of the poor are well housed. In all four countries about a fifth of children live in housing that is of a much higher or much lower standard than would be expected from their family's socio-economic characteristics. Thus, the influence of socio-economic status on child health can be distinguished from that of environmental services.

Towns and cities in these four countries are divided into differentiated housing areas: there is a close relationship between overall environmental conditions in a cluster and the facilities in each household. Where the necessary infrastructure exists most dwellings have individual facilities. In Brazil, for example, all the households in the quarter of clusters with

9 The calculation of Gini Coefficients from aggregate data is somewhat unusual but can be justified when the groups are of the same size. As in more usual applications, the coefficients represent a scale independent measure of inequality in a distribution. The coefficients relate the average absolute difference between every pair of groups to the mean level for the four groups and usually vary between zero, when provision is perfectly equal, and one, when provision is limited to a single member of a large population. Our data are pre-ordered and when the differential is in the counter-intuitive direction the coefficients are accorded a negative sign.

the best services have their own WC but, in the quarter of clusters with the worst sanitation, almost no households have a WC. In contrast to Brazil and, to a lesser extent, Ghana and Egypt, clusters that contain a mix of housing built to different standards are relatively common in Thailand: here environmental conditions differ less between the four cluster environmental groups than elsewhere.

Socio-economic status is also associated only loosely with the type of area in which families live. In all four countries, about a quarter to a third of the poorest quarter of children live in clusters with better than average environmental conditions and a similar proportion of the children from the quarter of households of the highest socio-economic status live in clusters with worse than average environmental conditions. Thus, the degree of residential segregation between socio-economic groups in the urban areas of these countries is limited: some relatively affluent families live in squatter settlements or inner city slum areas and some poor families in areas of planned housing. Some of the well-housed poor are servants, but the diversity of the occupations of this group is striking. Residential segregation is least clear cut in Thailand, reflecting the existence of mixed housing areas, and highest in Egypt, where there is a relatively strong tendency for socio-economic status to be reflected in housing conditions.

Univariate differentials

Table 3 presents a range of indicators of child health in the age group six months to three years for the four countries, according to sex, place of residence, socio-economic group and cluster environment group. The prevalence of most indicators of ill-health is highest in urban Ghana and lowest in Thailand. For example, the overall probability of death in childhood in urban Ghana is nearly double that in Egypt and Brazil and more than four times that in Thailand (see Table 1). Nevertheless, some exceptions to this pattern exist, notably the high proportion of children in Egypt who are classified as stunted. As the proportion of wasted children is very low in Egypt, there may have been significant biases in the measurement of height in this country (Pelletier 1991). This does not appear to affect our analyses of differentials in stunting within Egypt. It may invalidate comparisons between Egypt and the other countries of the prevalence of stunting.

Table 3
Differential mortality, morbidity and nutritional measures in children aged 6 - 36 months

Country	Outcome	Sex		Place of Residence		Socio-economic group					Cluster environment group				
		Female	Male	Major city	Other	1 (low)	2	3	4 (high)	Gini	1 (low)	2	3	4 (high)	Gini
Ghana	Mortality (per 1000)	41	59	32	68	62	39	46	44	0.06	65	38	42	51	0.05
	% Stunted	26	29	21	30	34	29	24	20	0.11	37	28	22	18	0.15
	% Wasted	7	8	5	9	8	9	8	6	0.06	8	8	10	5	0.06
	% Diarrhoea in last 2 weeks	37	37	37	36	36	48	33	32	0.05	36	41	41	26	0.15
	Number of children	282	263	164	381	195	100	124	126		172	141	123	109	
Egypt	Mortality (per 1000)	21	21	21	29	30	24	19	6	0.24	34	20	15	7	0.28
	% Stunted	30	25	22	29	35	25	24	25	0.07	34	27	26	18	0.12
	% Wasted	1	2	0	2	1	0	2	1	-0.13	3	0	0	0	0.75
	% Diarrhoea in last week	21	23	21	23	28	23	22	15	0.11	22	28	16	19	0.06
	Number of children[a]	832	855	399	1288	413	419	415	440		481	519	374	313	
Brazil	Mortality (per 1000)	18	21	10	20	39	20	9	3	0.42	48	11	11	2	0.48
	% Stunted	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	% Wasted	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	% Diarrhoea in last 2 weeks	23	19	20	21	28	22	16	14	0.15	30	23	15	14	0.17
	Number of children	483	610	380	713	333	291	248	221		350	290	297	156	
Thailand	Mortality (per 1000)	5	8	7	5	10	5	6	3	0.21	8	6	4	7	0.05
	% Stunted	9	13	10	13	19	10	7	6	0.25	9	10	12	13	-0.08
	% Wasted	5	4	5	3	6	4	5	2	0.16	4	5	5	3	0.04
	% Diarrhoea in last 2 weeks	11	14	14	11	20	12	10	9	0.16	19	16	5	10	0.19
	Number of children	312	315	345	282	169	160	132	166		177	164	145	141	

[a] In Egypt anthropometric data were collected from every other child.

Looking first at sex differentials, mortality is generally somewhat higher and stunting slightly more common among boys than girls. In Egypt, however, there is no sex differential in mortality in this age group and girls are more likely to be stunted than boys. Sex differentials in the period prevalence of wasting and diarrhoea are small and fluctuate erratically. Table 3 also shows that child health tends to be better in the major cities of Ghana, Egypt and Brazil than in smaller towns and cities.[10] In Thailand, the absolute differentials are small but tend to suggest that child health is worse in Bangkok. This is probably because the socio-economic status of households in Bangkok seems no better overall than that of households in other urban areas of Thailand. In the other three countries, the major cities have marked advantages according to many of the socio-economic indicators considered here. There is much less variation by place of urban residence in acute indicators of child health, such as diarrhoea, than in mortality. Except in Ghana, these differences in child health between the major cities and other urban areas are much smaller than the socio-economic and environmental differentials discussed in the rest of this paper. Thus, the unequal living conditions of different social groups tend to contribute more to differentials in child health within the urban sector than differences between urban areas in environmental and health infrastructure. As differentials in child health by sex and place of residence are fairly small, all the results that follow are presented for the two sexes combined and the entire urban sector to maintain the precision of the estimates.

Among children aged six months to three years, both relative and absolute socio-economic differentials in urban mortality are small in Ghana, increase in size through Egypt to Brazil, but are more moderate in Thailand. Figure 1 examines socio-economic inequality in mortality in the entire age range 0-15 years. The plots express the death rates on a log scale. Thus, constant differences between the lines imply equal relative risks of dying, rather than equal absolute differences in death rates. Socio-economic differentials in mortality are relatively small in the neonatal period but widen rapidly with increasing age. The relative differentials are small in Ghana and are not statistically significant at the 5 per cent level, although there is some suggestion that the urban poor have particularly high mortality. Socio-economic differentials are larger and significant in Egypt, where the best-off quarter of urban children has much lower mortality than the majority. In Brazil, the differential is still wider and rich children enjoy low mortality, the middle 50 per cent have fairly low mortality but poor children still have high mortality. Thus, although overall urban child mortality in Egypt and Brazil is about half that in Ghana, in both countries the poorest quarter of urban children has mortality that is nearly as high as the mortality of the least disadvantaged children in

10 We classify Accra, Cairo and Bangkok as major cities, together with a number of cities in Brazil. Over half the population of Brazil's major cities live in the metropolises of Rio de Janeiro and S‹o Paulo.

Ghana. In Thailand, the whole of the urban population benefits from relatively low child mortality. Thus the poorest children in Thailand have only slightly higher mortality than the most privileged quarter in Egypt and Brazil. The degree of inequality in mortality by socio-economic group in Thailand lies between that in Egypt and Ghana.

Figure 1
Age-specific death rates at 0 to 15 years by socio-economic group (1=low; 4=high)

Table 3 also reveals large differences in the health of living children by socio-economic group. In Ghana and Thailand, there is greater socio-economic inequality in stunting than is apparent in the mortality results. Moreover, there is a consistent inverse relationship between

the proportion stunted and socio-economic status; in Egypt, however, there is no significant difference between the socio-economic groups (at the 5 per cent level). In both Thailand and Egypt, there is some suggestion that stunting is particularly a problem of the poor. The results for wasting only show clear evidence of a relationship with socio-economic group in Thailand; this probably reflects the large sampling errors of estimates of the prevalence of this relatively uncommon state. There is a large and significant socio-economic differential in the period prevalence of diarrhoea in all countries, including Brazil. However, the poorest quarter of the women in Ghana report rather little diarrhoea in their children and the next quarter much more. To summarize, it appears that inequalities in child health, like those in mortality, are comparatively small in Ghana. Differentials in diarrhoeal morbidity are substantial in the other countries: in Thailand, differentials in nutritional status are also significant. None of these indicators of the health of living children, however, exhibits the five- to thirteenfold socio-economic differentials found in mortality in Egypt and Brazil.

Relationships between the cluster environment and mortality, stunting, wasting and diarrhoea in the two weeks before the survey are also shown in Table 3. There is considerable variation in all outcomes according to environmental conditions. Compared with the socio-economic differentials, environmental disparities in mortality are even greater in urban Brazil but less clear-cut in urban Ghana or Thailand. There are larger cluster-environment than socio-economic differentials for stunting in Ghana and Egypt but smaller ones in Thailand. The prevalence of diarrhoea exhibits a clear trend by cluster-environment group in Brazil and Thailand. Elsewhere the picture is confused. Except in Thailand, the relationship between the environmental characteristics of neighbourhoods and child mortality and morbidity is stronger than that found for socio-economic status.

Bivariate differentials

Figure 2 shows the joint effects of socio-economic status and cluster environment on mortality, stunting and diarrhoea in the previous two weeks.[11] For mortality, the four-way socio-economic and cluster-environment classifications are collapsed into two categories (1 = poorer; 2 = less poor) so as to obtain reasonably precise results despite the small numbers of deaths reported. In urban Ghana and Thailand the major influence on the probability of dying between ages 6 months and 36 months is socio-economic status and not environmental conditions in the cluster. Nevertheless, the small effect of the environment in Ghana is statistically significant at the 10 per cent level. In Egypt there is a significant interaction between the two sets of influences: those children who both enjoy a good environment and are relatively well off have particularly low mortality. In Brazil the reverse interaction is found: those poor people who also live in bad conditions have much higher mortality than any other group.

While socio-economic group tends to be the more important determinant of urban mortality, cluster environment is more strongly associated than socio-economic group with the prevalence of stunting among young children in Ghana and Egypt; the counter-intuitive direction of the effect of cluster environment in Thailand is not statistically significant. Significant results for wasting (not shown) are obtained only in Egypt: in this country, despite

11 These are fitted estimates produced using logistic regression. The model of mortality is described on pp. 166-167. Age in months is included in all the models as a covariate. Age squared is included in the models for stunting, so as to model the peak in its prevalence around the time of weaning, but does not improve the fit of the models for diarrhoea prevalence. The fitted odds underlying the graphs for stunting and for diarrhoea are presented as Model 1 in Tables 5 and 6. The statistics shown in Figure 2 refer to the midpoint of the age interval 6-36 months.

small numbers, there is a sharp differential in wasting between clusters (significant at the 10 per cent level) after controlling for socio-economic factors.

Landscape page for figure 2

Both socio-economic status and environmental conditions in the cluster are associated with the period prevalence of diarrhoea at 6 - 36 months; the differentials are larger and clearer in countries in which the prevalence of diarrhoea is lower. This is particularly evident when environmental variation is examined: thus, cluster-environment differentials are larger than socio-economic ones in urban Brazil and Thailand but insignificant in Egypt. In Brazil and Thailand, the cluster environment explains part of the socio-economic effect; in Egypt it does not and, moreover, socio-economic status is more strongly related than the cluster environment to the period prevalence of diarrhoea. In contrast, in Ghana there is limited variation according to either factor (if the lower two socio-economic groups are averaged), with the exception that children with the best cluster environment have significantly lower diarrhoea rates than anyone else. This may be because environmental conditions are so poor in most parts of urban Ghana that children are frequently exposed to infection whatever their socio-economic status.

To summarize, after socio-economic status is controlled for , environmental conditions in the area where young children live are strongly related to their mortality in Egypt and Brazil, to stunting in Ghana and Egypt and to diarrhoea prevalence in Brazil, Thailand and, for the best conditions, Ghana.

Table 4 examines the relationships between household water and sanitation facilities, and mortality, stunting and diarrhoea between six and 36 months of age by socio-economic group. A two-way socio-economic classification is used that distinguishes the poorer and better off halves of each urban population. Thailand is not included in this table because most households have both a toilet draining into a tank and water piped into their home. The small number of households with other types of water supply and toilet, combined with the relative infrequency of adverse health outcomes in Thailand, means that any real variation by household facilities is overwhelmed by sampling errors.

Table 4
Mortality, morbidity and nutritional measures in children aged 6-36 months by household water and sanitation facilities and socio-economic status.

	Ghana		Egypt		Brazil	
	Socio-economic group					
	Low	High	Low	High	Low	High
Mortality (per 1000)						
Water piped in	68	24	35	13	18	2
Other water	65	68	56	121	40	9

Flush toilet	43	48	13	9	24	0
Other toilet	80	48	41	23	29	7
Percentage stunted						
Water piped in	11	18	29	24	—	—
Other water	36	25	32	39	—	—
Flush toilet	32	21	25	22	—	—
Other toilet	33	23	32	30	—	—
Percentage with diarrhoea in 2 weeks before study[a]						
Water piped in	46	30	25	19	20	15
Other water	39	35	28	15	31	21
Flush toilet	39	30	24	17	13	14
Other toilet	40	36	26	21	30	18

[a]In Egypt diarrhoea was measured over a one-week period.

In Ghana, the mortality results in Table 4 reveal an interaction between socio-economic status and water facilities. Those children who are of high status and have water piped into their home have much lower mortality than anyone else. On the other hand, those who are of low socio-economic status and have no flush toilet fare much worse than the rest of the urban population. In Egypt, water facilities and socio-economic status also interact: children who are of high status and have water piped into their home have much lower mortality than anyone else. Moreover, there is some suggestion that, as in Ghana, children in poor households that also lack a WC have particularly high mortality. In Brazil, the household's water and sanitation facilities are both associated with mortality after controlling for socio-economic status.

Stunting is more common among those Ghanaian children living in households that lack access to their own piped water supply (see Table 4). The difference is greater for those of low socio-economic status. Toilet facilities do not affect stunting after controlling for socio-economic status. In Egypt, on the other hand, both toilet and water facilities are related to stunting. Moreover, socio-economic status is not very important after controlling for access to water and sanitation.

In Ghana, according to Table 4, socio-economic status is more strongly associated than either water or sanitation facilities with the prevalence of diarrhoea. Egyptian children are less likely to have diarrhoea if they live in households with access to a flush toilet but gain no such advantage from living in dwellings with an individual piped water supply. In Brazil children from both poor and more wealthy households have higher rates of diarrhoea if they have poor water and sanitation facilities than if they have access to piped water and flush toilets. In all three countries, a socio-economic differential in diarrhoea prevalence in the expected direction persists after household facilities are controlled for .

Multivariate differentials

In this section, we further examine the net effect of the factors associated with the prevalence of stunting and diarrhoea. Unfortunately, the urban samples available from the DHS surveys are too small for us to analyse differentials in recent mortality in this way. The estimated odds of children aged 6 - 36 months being stunted or having diarrhoea, compared with a baseline category, are presented in Tables 5 and 6. The mediating role of household facilities in the determination of child health is examined by comparing models that exclude them (Model 1) with models that do not (Model 2). The nature of households' water supply and toilet facilities is linked. The two measures are never both associated significantly with child health after socio-economic status and cluster environment are controlled for. Results are shown

only for those indicators of the household environment that are significantly associated with health outcomes.

In urban Ghana, the nature of the household's water supply is strongly associated with stunting after controlling for socio-economic status and the environment of the cluster in which the household is located (Table 5). Adding this indicator to the model greatly attenuates the relationship between the cluster environment and stunting. In contrast, in Egypt, household-level environmental variables do not intervene in the strong relationship between the cluster environment and stunting. Finally, in Thailand, the cluster environment is unrelated to stunting but children in households with poor or no toilet facilities are much more likely to be stunted than other children after socio-economic status is controlled for. This pathway accounts for a small part of the association between socio-economic status and stunting.

Table 5
Odds of moderate or severe stunting (low height for age), children aged 6 to 36 months.[a]

		Ghana		Egypt	Thailand	
Explanatory factor	**Value**	**1/**	**2/**	**1/**	**1/**	**2/**
Socio-economic group	1 (low)	2.0**	1.8*	1.2	3.6***	2.7**
	2	1.4	1.2	0.9	1.8	1.4
	3	1.1	1.1	0.8	1.2	0.9
	4 (high)	1	1	1	1	1
Cluster environment group	1 (low)	2.5**	1.4	2.2**		
	2	1.6	1.1	1.7*		
	3	1.3	1.1	1.6		
	4 (high)	1.0	1	1		
Water supply	Piped in		1			
	Piped out		1.8*			
	Other		2.4**			
Type of toilet	WC/tank					1
	Other					2.7**
Decrease in -2 log likelihood		77.3	4.7	22.2	14.4	5.0
d.f.		8	2	8	5	1

[a]All the models include age and age squared as covariates.

*P<10%, **P<5%, ***P<1%.

Note: 1/ and 2/ refer to Models 1 and 2 respectively. See text for details.

Turning to diarrhoea prevalence, in Ghana it is the household's toilet facilities, not its water supply, that are more strongly associated with this aspect of child health (Table 6).

However, controlling for this relationship does not greatly attenuate the cluster environment differentials. In Egypt, children in households that share toilet facilities are more likely to have diarrhoea than other children but controlling for this has little effect on socio-economic differentials in diarrhoea prevalence. In Thailand, children in households that do not drink piped water are less likely to suffer from diarrhoea than those in households that do: in this country, most such children drink bottled or rainwater, not surface or well water. Controlling for this does not reduce socio-economic differentials in diarrhoea prevalence but somewhat attenuates the cluster environment differentials.

In Brazil, household toilet facilities are associated strongly with diarrhoea but here, only those children in dwellings with poor toilet facilities who also live in poorer areas have higher diarrhoea rates (Table 6). This interaction is analogous to that between socio-economic status and cluster environment for mortality (see Figure 2). While about half the children in the group suffering a high prevalence of diarrhoea live in the deprived North-Eastern region of Brazil, further analyses (not shown) make it clear that it is poor environmental conditions that explain the high prevalence of diarrhoea in urban areas of the North-East, rather than confounding with region that produces the interaction.

Table 6
Odds of diarrhoea in the previous two weeks, children aged 6 to 36 months.[a]

		Ghana		Egypt[b]		Thailand		Brazil	
Explanatory factor	**Value**	**1/**	**2/**	**1/**	**2/**	**1/**	**2/**	**1/**	**2/**
Socio-economic group	1 (low)	1.1	1.0	2.4***	2.2***	1.9*	1.8	1.7**	1.4
	2	2.0**	1.9**	1.7***	1.6**	1.1	1.2	1.3	1.2
	3	1.1	1.0	1.5**	1.5**	1.0	1.0	1.0	1.0
	4 (high)	1	1	1	1	1	1	1	1
Cluster environment group	1 (low)	1.5	1.2	0.8	0.7	1.9**	1.6	2.1***	
	2	1.8**	1.6	1.3	1.2	1.6	1.2	1.6*	
	3	2.0**	1.8*	0.7	0.7	0.5	0.4*	1.0	
	4 (high)	1	1	1	1	1	1	1	
Type of toilet	WC		1						
	Pan/KVIP		1.3						
	Pit latrine		1.2						
	None		2.2*						
Shared toilet	Yes				1.6**				

	No			1				
Water	Piped in					1		
	Bottled					0.3**		
	Other					0.6		
Cluster	1 or 2 / Other							2.6*
environment	/ WC or tank							1.1
group by type	3 or 4 / Other							0.9
of toilet	/ WC or tank							1
Decrease in - 2 log likelihood		32.1	4.3	109.7	7.4	30.9	7.0	40.2	57.3
d.f.		7	3	7	1	7	2	7	0[c]

[a]All the models include age as a covariate.

[b]In Egypt diarrhoea was measured over a one-week period.

[c]In Brazil, Model 2 is not nested in Model 1 but Model 2 is a significantly better fit than that for socio-economic group and a two-way cluster environmental grouping, while Model 1 is not.

*P<10%, **P<5%, ***P<1%.

Note: 1/ and 2/ refer to Models 1 and 2 respectively. See text for details.

Discussion

The first aim of this analysis of DHS data has been to document socio-economic differentials in child mortality and morbidity within the urban sector of several developing countries. The pattern of differentials varies between countries according to both their overall degree of development nationally and their particular history of urban development. Thus, socio-economic differentials in child mortality within the urban sector of Ghana are modest and those in Thailand moderate, whereas the equivalent differentials are large in Egypt and very large in Brazil. In general, these differentials are larger than those recorded by the DHS surveys according to urban-rural residence or mother's education (Arruda et al. 1987; Chayovan et al. 1988; Abdel-Aziz Sayed et al. 1989; Ghana 1989). Even in urban Ghana, 18 per cent of the children of the poorest quarter of women die before age 15, compared with only 12 per cent of the children of other women. Moreover, except in Egypt, the mortality of the children of the urban poor is at least as high as that of the rural population as a whole.

In the four countries studied, a link exists between the overall level of child mortality in the urban population and the size of socio-economic differentials in mortality within the urban sector. In Ghana, overall urban child mortality is fairly high because the whole of the urban sector experiences high mortality, except perhaps for an elite that is too small to identify using these data. In Thailand, overall child mortality is low because even the urban poor have fairly low mortality. In contrast, in Egypt and Brazil, intermediate levels of urban child mortality reflect low mortality among the children of relatively affluent urban residents but high mortality among the urban poor. Thus, the benefits of development have accrued disproportionately to better-off urban dwellers in these two countries, while the basic needs of the urban poor manifestly remain unmet. The extent to which the wide differentials found in Egypt and Brazil are typical of other countries in the intermediate stages of mortality transition could only be established by a much larger-scale study. Elsewhere, economic and

urban development policy may have ensured that the benefits of increasing national wealth are distributed more evenly across the urban sector.

Socio-economic differentials in young children's nutritional status and diarrhoeal morbidity are usually much smaller than those in mortality. As for mortality, differentials in the prevalence of diarrhoea are small in Ghana and larger in Egypt and Brazil. In Thailand, there are large socio-economic differentials in the prevalence of diarrhoea, wasting and stunting. Thus, in these four countries, better child health on average is associated with greater socio-economic inequalities in health. These findings suggest that the middle classes act more effectively to prevent their children's death than to preserve their children's health. In addition, it is only in the more developed of these countries that relatively affluent urban residents are able to protect their children from infection more successfully than the poor.

Thailand is characterized by relatively large socio-economic differentials in child morbidity but small ones in mortality. This implies that, although the poor remain more exposed to infectious disease, care for sick children is sufficiently effective that it usually prevents ill-health among poorer children progressing to death. Equally, the fact that modest socio-economic differentials in diarrhoeal disease in Egypt and Brazil lead on to larger differentials in stunting in Egypt and very large mortality differentials in both countries, suggests that differential use of health services and other forms of care is compounding the effect of differential exposure to infection between the urban poor and those who are better off.

The contrast between the pattern of child health and mortality in urban Thailand and urban Brazil is striking. Although GNP per capita is lower in Thailand than in Brazil, urban child mortality is much lower in Thailand. The fact that Brazil is much more urbanized than Thailand is probably pertinent; nevertheless, within their urban populations the health of the poorest quarter of children in Thailand is only slightly worse than that of the most affluent quarter in Brazil. This strongly suggests that greater equity within urban areas in provision of environmental services, health care and other aspects of social development not only reduces differentials in health outcomes among children, but can greatly affect the overall level of urban child health in a country.

The second aim of this study has been to investigate the role of the urban environment in shaping socio-economic differentials in child health and mortality. It focuses on the age range six months to three years as the determinants of health differ between early infancy and later childhood. The analysis compares patterns of socio-economic and environmental differentials in different outcome measures to try to separate the direct effect of the urban environment on child health from the effect of the socio-economic profile of the population living in areas with differing levels of facilities. As for socio-economic differentials, the relationship between the environment and child health varies between the countries.

In Brazil and Thailand, net cluster environment differentials in diarrhoea prevalence among children are larger than net socio-economic differentials, whereas the reverse is true for mortality. As was discussed above, this pattern suggests that living in an area with good facilities reduces diarrhoeal disease by limiting exposure. The clusters are less clearly differentiated in Thailand than elsewhere; this suggests that it is not the degree of inequality in environmental conditions that explains the size of the associated differentials in childhood diarrhoea, but whether they straddle an epidemiologically significant threshold. In Brazil, these cluster environment differentials in morbidity are precursors to differentials in mortality and part of the gross socio-economic differential in mortality is explained by environmental conditions. In addition, the negative effect of bad housing on mortality is much greater for the children of the poor than for those of the better-off, suggesting that only the latter have the resources to provide their sick children with the health and other care needed to stop a history of infections proceeding to death. In Thailand, however, the cluster environment differentials in diarrhoea are not mirrored in stunting or mortality after controlling for socio-economic

status. Thus, in this country, while children living in areas of poor-quality housing experience a relatively high prevalence of diarrhoea, residence does not prevent parents from preserving their children from long-term ill-health and death. This may reflect either the more equitable housing conditions that prevail in urban Thailand or more widespread access to and use of health services.

In Ghana and Egypt, cluster environmental differentials in diarrhoea prevalence among young children are modest after socio-economic status is controlled for, and explain few of the corresponding socio-economic differentials. Thus, urban environmental conditions in low-income countries may fall below the threshold at which exposure to diarrhoeal infections begins to decline: the lower prevalence of diarrhoea among better-off children in these countries reflects the household's resources, not its location. In Egypt, however, children in households that share toilets are 60 per cent more likely to have diarrhoea than other children. Sharing a toilet clearly increases the exposure of children to infection from the environment outside the household. It is unclear why the cluster environment is associated with mortality and stunting in both countries. Perhaps there is a relationship between poor environmental conditions and diarrhoeal disease that is masked by differential misreporting of diarrhoea; or perhaps environmental conditions affect other forms of morbidity, such as respiratory disease or accidents (Ramasubban and Crook 1985). Alternatively, the cluster environmental index may be associated with use of health services or aspects of socio-economic status that are not captured by the socio-economic index, leading to problems of confounding between these two groups of explanatory factors.

Our data suggest that the overall quality of water and sanitation services in Egypt is similar to that in Brazil or Thailand. Nevertheless, child health remains worse and the only clear evidence that environmental conditions are associated with diarrhoeal disease is the adverse effect of sharing a toilet. This may be because aspects of the urban environment that we are unable to measure are poorer in Egypt than the other two countries. For example, sewage flooding may be more common or population densities higher. Alternatively, lower levels of income and literacy and poorer health services may mean that mothers in Egypt are less able to realize the potential of basic services for preserving their children's health.

We concluded that the quality of the urban environment does have an important effect on the health of children aged six months to three years. However, differences in the urban environment are not the main explanation of variation in the relative size of socio-economic differentials in mortality and child health across these four countries. Thus, environmental factors account for much of the univariate socio-economic differential in nutritional status in Ghana and Egypt but not Thailand. They only account for a significant part of gross socio-economic differentials in diarrhoea and mortality in Brazil.

The third issue that has been investigated here is the relative effect of environmental conditions in the neighbourhood and household on diarrhoea prevalence and nutritional status. After socio-economic status and cluster environment are controlled for, the minority of children in households with the worst facilities have much worse health than other children. This may mean that these indicators identify a group of very poor families with particularly poor health or it may reflect the adverse effect of an unhygienic household environment.

If the only important factor were sanitation in the dwelling where children live, the association between living in a more sanitary neighbourhood and child health would exist only because neighbourhood services are a precondition for installation of running water and modern toilets in individual dwellings. In fact, controlling for household facilities does attenuate the association between the cluster environment and stunting and diarrhoea. To a much lesser extent, the association between socio-economic status and child health is attenuated in the same way. This confirms that one way these two determinants influence child health is through households' adoption of sanitation services. On the other hand, the pattern of the effects suggests that the cluster environment in Thailand and Ghana and sharing

a toilet in Egypt continue to exert a direct influence on diarrhoea prevalence. In Brazil, however, cluster environment only improves the explanation of the prevalence of diarrhoea in households with very poor toilet facilities. This may be because the environment in the cluster influences exposure to diarrhoeal infections directly but adequate household toilet facilities are indicative of the family's ability to shield children from such risks. In this multivariate analysis most of the cluster environment differentials in diarrhoea prevalence are statistically insignificant. Nevertheless, taken together, the pattern of effects strongly suggests that children six months to three years old who live in neighbourhoods with a poor environment have worse health than other children of the same age, after the characteristics of their households are controlled for.

The main limitation of this study is its inability to consider all the important characteristics of different urban populations that may influence child health and mortality. This partly reflects the restricted information on the characteristics of urban communities collected by DHS surveys. In addition, as the samples of urban children are fairly small, it is impossible to explore the role of all the factors that may condition the influence of the urban environment on child health. Thus, mothers' education is treated as a facet of socio-economic status and we do not explore whether the large differences between the four countries in the proportion of women with dependent children who are married modifies the effect of socio-economic and environmental factors on child health. Moreover, differential access to effective health services may lead to variation between countries and urban areas in individual countries in patterns of child health and mortality. An in-depth study of Brazil, that links the DHS data to city-level information on the provision of health and other services, suggests that such considerations are important (Sastry, Goldman and Moreno 1993). More such research, based on the synthesis of national data sets, could be very illuminating. The current study demonstrates that both socio-economic status and the environment in the urban sector greatly affect child health. Further investigation is needed, however, to clarify why these relationships differ between countries in the ways identified here.

This analysis of DHS data emphasizes two issues to be borne in mind when interpreting other investigations of urban child health. First, differentials in morbidity may differ from those in the more commonly measured health outcome, mortality. In Thailand, at least, fairly small intra-urban differentials in child mortality coexist with substantial inequality in other aspects of health. Second, the nature of intra-urban differentials in child health differs greatly between countries. Thus, over-generalization from particular case studies must be avoided. Equally, however, such international differences emphasize that appropriate economic and urban development policies can benefit the health of the urban poor even if resources remain very constrained.

Conclusions

There are major socio-economic differentials in child health and mortality within the urban sector of all four countries investigated here. These differentials are at least as large as those by other socio-economic indicators, such as urban or rural residence or mother's education, yet have received less attention from both researchers and policy makers. Our results confirm that the mortality of the children of the urban poor is often as high as that of rural children.

In the developing world, socio-economic status, access to health services and environmental conditions all affect the health and mortality of children living in towns and cities. These factors are inter-related in their effects. Their relative importance, and the size of intra-urban differentials in child health, vary greatly between countries, reflecting both their overall national income and their particular histories of economic and urban development. By implication, appropriate development policies can improve urban child health. Equally, the scale of differentials in child health does not depend only on the degree of socio-economic

inequality within a population; it also depends on whether there is a division in the urban population between families that live in environmental conditions that enable them to rear healthy children and families that do not.

While the results of this analysis emphasize the importance of a sanitary environment in the control of diarrhoeal disease, they suggest that other factors sometimes substitute for environmental improvements in the reduction of mortality. Furthermore, in countries where environmental conditions in urban areas remain very poor, investment in water and sanitation projects may not immediately affect child health. Nevertheless, it represents the foundation for future progress as well as benefiting human welfare in other respects.

Finally, we have argued that the health of children in urban areas is influenced by the wider social and physical environment of the household. Child health is not determined solely by disposable household income and the way that it is spent. Access to effective primary health care services is widely acknowledged to benefit health. Our results support the view that, as in late-nineteenth century Europe, concern for the public health also must extend to encompass the urban environment.

Appendix

The socio-economic index is intended to differentiate between better-off and poor households, in the absence of income data, using data on educational background, men's and women's occupations and ownership of consumer durables. The environmental index is intended to distinguish clusters with better and worse environments using data on the construction of dwellings, drinking water supplies and toilet facilities. As there is no usual order in which durables are acquired or improvements made to the dwelling, these scales were constructed by summing the variables employed. Because televisions cost more than radios, for example, the characteristics contributing to each scale are weighted on the basis of their prevalence. These weights are assigned on a logarithmic scale. Thus, if 25 per cent of women have one characteristic and 50 per cent another, somebody with both characteristics is assigned a weight equivalent to that for a characteristic possessed by 12.5 per cent of women. Using their individual scores, women are divided into four approximately equal sized groups along each axis of variation.

Before construction of the socio-economic scales, some consumer durables are dropped in each country because hardly anybody owns them. Data on female occupations are treated differently in the four countries reflecting variation in the proportion of women who are economically active, and evidence from their association with other variables that some occupations, especially sales, differed greatly in status between countries. For women, only occupations that are clearly high-status contribute to the socio-economic scales: women involved in other forms of economic activity are grouped with the inactive.

The average size of the urban clusters ranges from 193 to 304 households between the countries. The mean number of women interviewed in each urban cluster ranges from 21 in Ghana to 62 in Brazil survey: it is thus possible to estimate the environmental characteristics of each cluster fairly accurately. In Brazil, nearly all households have a piped water supply.

Thus, as no information is available on the construction of dwellings, the cluster environmental scale for Brazil is based on data on toilet facilities alone. In all countries, the cluster scale for each woman was constructed using information on all the sampled dwellings in the cluster except the one in which she lives, to avoid conflating the influences of neighbourhood and household characteristics on child health.

The variables and weights used to construct the scales are shown in Tables A.1 to A.4 on the following pages.

Table A.1
Construction of the socio-economic and environmental scales, Ghana.

Socio-economic scale		Environmental scale	
Woman's education		**Dwelling construction**	
None	0.000	Thatch roof	0.000
Primary	0.315	Other roof	0.036
Secondary +	1.923	Earth or mud floor	0.000
Husband's education		Other floor	0.064
None	0.000	Burnt brick or mud walls	0.000
Primary/No husband/n.k	0.149	Other walls	0.361
Secondary+	1.467	**Source of drinking water**	
Husband's occupation		Other	0.000
Agriculture/Unskilled/None	0.000	Stand pipe outside plot	0.308
Skilled/No husband/n.k.	0.197	Piped to dwelling	1.019
Sales/Service	1.178	**Toilet facilities**	
Professional/Technical/Managerial	1.687	None	0.0
Ownership of durables		Pit latrine	0.134
None	0.000	Pan/KVIP/Other	0.653
Radio	0.599	Water closet	1.766
Electricity	0.416		
Electricity + Television	1.441		
Car	2.245		

Table A.2
Construction of the socio-economic and environmental scales, Egypt

Socio-economic scale		Environmental scale	
Woman's education		**Dwelling construction**	
None	0.000	Earth floor	0.000
Primary	0.412	Cement floor	0.067
Secondary	1.254	Other floor	0.148
Higher	2.394	**Source of drinking water**	
Husband's education		Other	0.000
None	0.000	Stand pipe outside plot	0.036
Primary/No husband/n.k	0.240	Piped to dwelling	0.171
Secondary	0.985	**Toilet facilities**	
Higher	1.768	Other	0.000
Husband's occupation		Pour flush (attached to a sewer)	0.232
Agriculture/Unskilled	0.000	Water closet	0.814
Skilled/Service/No husband/n.k.	0.139	**Shared toilet**	
Sales	0.859	Yes	0.000
Professional/Technical/Managerial	1.433	No	0.103
Woman's occupation			
Other/None	0.000		
Clerical/Sales	1.801		
Professional/Technical/Managerial	2.503		
Ownership of durables			
None	0.000		
Television	0.094		
Refrigerator	0.227		
Car	1.941		

Table A.3
Construction of the socio-economic and environmental scales, Brazil

Socio-economic scale		Environmental scale	
Woman's education		**Toilet facilities**	
None	0.000	None/Pit latrine	0.000
Lower Primary/n.k.	0.055	Tank	0.065
Upper Primary	0.476	Water closet	0.616
Secondary	1.121		
Higher	2.470		
Husband's education			
None	0.000		
Lower Primary/No husband/n.k	0.047		
Upper Primary	1.153		
Secondary	1.851		
Higher	2.753		
Husband's occupation			
Domestic/Agriculture/Other	0.000		
Skilled/No husband/Never worked	0.069		
Sales/Service	1.208		
Professional/Technical/Managerial/n.k.	2.029		
Ownership of durables			
None	0.000		
Television	0.167		
Car	1.222		
Employs maid	2.286		

Table A.4
Construction of the socio-economic and environmental scales, Thailand

Socio-economic scale		Environmental scale	
Woman's education		**Dwelling construction**	
None	0.000	Earth floor	0.000
Primary	0.062	Other floor	0.526
Secondary	1.038	**Source of drinking water**	
Higher	2.097	Other	0.000
Husband's education		Piped to dwelling	0.278
None/	0.000	Bottled water	1.692
Primary/No husband/n.k	0.022	**Toilet facilities**	
Secondary	0.699	None/Pit latrine	0.000
Higher	1.844	Septic tank	0.044
Husband's occupation		Water closet	2.132
Domestic/Agric. labourer/Unskilled	0.000		
Skilled/No husband/Never worked	0.072		
Sales/Service/Farmer	0.549		
Professional/Clerical/n.k.	1.325		
Woman's occupation			
Other/None	0.000		
Professional/Clerical	1.899		
Ownership of durables			
None	0.000		
Television	0.176		
Refrigerator	0.446		
Motorbike	0.967		
Car	1.432		

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Health Transition Review 5, 1995, 191 - 206

Fathers' perception of child health: a case study in a squatter settlement of Karachi, Pakistan*

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Abstract

This study looks at child health from a father's perspective. While the close relationship between children and mothers has been acknowledged, and brought about the concept of Mother and Child Health (MCH), little attention has been paid to the role of fathering.

In Pakistan, where the study was undertaken, a high infant and under-five mortality coincides with a low acceptance of MCH services and a tradition of female seclusion, , which severely limits women's movements in public. *Purdah* is often cited as an important cause for the low MCH-coverage, indicating an inappropriate design of established MCH-services with its exclusive focus on mothers, and prompting the questions taken up in this study: what is the role of fathers in child health, how do they define child health needs and how do they participate in child care?

The study was undertaken in the squatter settlement Orangi in Karachi where the Aga Khan University is involved in a PHC program. A set of qualitative methods was used including key informant interviews, focus group interviews with fathers, group interviews with women and community health workers with a total of 61 informants, and observation of father-child interaction.

Apart from their basic role as breadwinners, most fathers participate directly in child care. As far as working hours allow, fathers spend time with their children by taking them out or playing with them. Among 174 cases of child holding in roads and places, 75 per cent were carried by the father; this was true for the majority of children even in the mother's presence. One-third of children brought to general practitioners were accompanied by the father. Fathers help their wives in child care in activities like feeding, soothing, bathing and giving medicine; a considerable minority even changes nappies.

In the socio-cultural context, the high level of male involvement especially in caretaking outside the house can be seen as a coping mechanism with the tradition of female seclusion. The qualities of fathers as key decision-makers and second line caretakers and

*This study was a joint collaboration between the University of Heidelberg and the Aga Khan University, Karachi, and formed part of a thesis for an M.Sc. Course in Community Health and Health Management at the University of Heidelberg. The authors are much indebted to Prof. J. Bryant, former head of the Department of Community Health Sciences of AKU, for his encouraging support and advice. We gratefully acknowledge the help of Ms. N. Khatoon in moderating the focus groups, of Mr. Mastullah for interpreting and organizational support and of Ms. T. Jamal and the other members of the Orangi PHC-team. We also want to thank our informants in Orangi for their friendly collaboration.We are particularly thankful to Prof. S. Rifkin, who as the thesis tutor supported this study throughout with valuable advice and interest and critically reviewed the manuscripts.

mothers' role as primary caretakers call for a two-pronged approach to child health, addressing and involving both parents.

Up to now child health problems have been addressed almost exclusively in the context of Mother and Child Health (MCH) programs. There are valid reasons for regarding mothers and their status as crucial for their children's future: mothers' education and their autonomy in decision-making have been repeatedly found to be strong determinants of child health (Caldwell 1986; Doan and Bisharat 1990). However, little attention has been paid to the role of fathering.

Regarding non-Western Societies Hewlett (1991) concluded:

> The researchers do not know much about the father's role and simply claim that it is minimal. These factors have contributed to the complete absence of systematic studies in non-Western societies of the father's role in infant and child development.

Although fathers' contribution to child health has been acknowledged (Williams, Baumslag and Jelliffe 1985: 154, 181, 271; Reitmeier 1989), only minimal attention has been given to fathers' perception of child health needs, and fathers have not been addressed in the context of child health programs.

In an attempt to counterbalance this deficiency, the study focuses on fathers as contributors to child health with special emphasis on fathers' concept of child health needs and fathers' participation in child care. Considering the lack of previous research to build on, the primary intention was to gather baseline information and to prepare the ground for more specific research.

The study context

According to the United Nations Development Programme, Pakistan belongs to the low-income group of developing countries with a third of its 112 million inhabitants living below the poverty line. The South Asian country has a population growth of 3 per cent per year (UNDP 1991); basic health indicators for 1991 show high infant and under-five mortality rates of 97 and 139 per 1000 live births (World Bank 1993). This has coincided with low coverages in Mother and Child Health. In 1982 coverage for antenatal care was 26 per cent, for vaccination 5 per cent and growth monitoring 3 per cent (Mahmud 1986). Despite considerable efforts to expand MCH services in the course of the Accelerated Health Programme, launched in 1983, vaccination coverage could be increased till 1991 to 35 per cent only and coverage of antenatal care remained unchanged with 26 per cent (National Institute of Population Studies 1992). Polio, reduced to almost zero in most developing countries and targeted for eradication by WHO, is on the increase with 1803 registered cases in 1993 (WHO 1995).

A mismatch of the established way of service delivery with the tradition of female seclusion, *Purdah*, with its restrictions on women's appearance and movement in public, was repeatedly identified as an important reason (World Bank 1989; Aga Khan University 1990). *Purdah* consists of a set of rules ensuring the segregation of sexes outside well defined categories like extended family and next kinship. This is achieved either by seclusion of women at home or by the use of the *burqa*, a concealing veil. Related to *Purdah*, South Asian Muslims follow a system of arranged marriages, usually among cousins (Papanek 1982).

The study was conducted in Karachi in the squatter settlement Orangi, where there has been a Primary Health Care Programme of the Aga Khan University (AKU) since 1986.

The study area

Situated in Karachi's District West, Orangi has an estimated population of one million and is reported to be the largest squatter settlement in South Asia. Fifty per cent of its population are below 15 years old. Ninety per cent of the population are Mohajirs, Muslim immigrants from India and the former East Pakistan, now Bangladesh; the remaining 10 per cent are migrants from other parts of Pakistan: Punjabis, Balochis and Pathans. The pattern of cousin marriage is found in about half of couples. The literacy rates are 62 per cent in males and 41 per cent in females, which is above the national average of 57 per cent in males and 32 per cent in females but below the national average for urban areas with 73 per cent and 57 per cent respectively (National Institute of Population Studies 1992). The average monthly family income in 1991 was 2300 rupees, equivalent to 92 US dollars.

Occupations among Orangi residents include skilled office workers, permanently employed factory workers in a steel mill and garment factories, small-scale home-based industries, artisans, street vendors and a large group of day labourers. Ninety per cent of the houses have piped water, and almost all have electricity; however, the supply of both is frequently interrupted. Drug addiction has emerged as a major social problem in recent years. A countrywide survey in 1988 revealed over a million heroin addicts, roughly one per cent of the population (Government of Pakistan 1993), the estimate for urban squatter areas being at least twice as high.

The Primary Health Care field site of Aga Khan University in Orangi covers a defined geographical area with 9517 registered inhabitants in 1506 households (93% of all households in the area), including 1383 children under five years. In 1991 the infant mortality rate was 77 per thousand live births and the prevalence of malnutrition according to the Gomez Classification was 36 per cent for first, 6 per cent for second and 1 per cent for third degree malnutrition. The most common diseases were diarrhoea, cough and feverish illnesses including malaria; the leading causes of death in under-fives were diarrhoea, respiratory tract infections, malnutrition, low birth weight and fever. Polio accounted for 30 per cent of childhood disability, followed by meningitis and perinatal problems with 15 per cent each.

Within the field site the main MCH interventions are performed by a team of female community health workers (CHW) through monthly household visits, and include growth monitoring, vaccination, antenatal care and health education. This service is backed by a Primary Health Care centre which offers also curative care. Outside the field site, MCH service delivery follows the usual centre-based approach with dispensaries, hospitals and private clinics as the main outlets. According to survey findings and field site reports of Aga Khan University, the household-based approach has resulted in an increased coverage of MCH interventions. Complete vaccination coverage was 80 per cent within the field site against 41 per cent in other areas of Orangi and 46 per cent in urban areas on a national level (National Institute of Population Studies 1992).

Methodology

A qualitative study design was chosen, consisting of a set of complementary qualitative methods and including key informants, focus group interviews and observation. Among the reasons for this design was the lack of baseline information from which hypotheses could have been formed and quantitatively tested. Following the concept of triangulation (Walker 1985), data obtained by the different qualitative methods were cross-checked with each other and compared with previous research and related documents.

Information was obtained from 61 respondents: 16 key informants, 21 fathers in focus groups, 11 mothers in lane meetings and 13 female community health workers in a feed-back

discussion on preliminary findings. Further sources were observations on father-child interactions and a document review.

Key informants

Following the recommendations by Annett and Rifkin (1988) for the selection of key informants, the following persons were interviewed: a representative of the Orangi Pilot Project, a large non-government community development organization which was particularly successful in mobilizing Orangi residents to built an underground sewerage system on their own; a former field director of the Orangi site, who, as a medical doctor, was in charge of the Orangi PHC team for a considerable time; a retired teacher and community leader; a shopkeeper; two community health workers; two general practitioners working in Orangi; a traditional midwife; a herbalist; three fathers with children under five years; three mothers with children under five years, unrelated to the interviewed fathers. The selection of individuals was purposive. The aim was to include accepted representatives of the groups of professionals and to include different sections of the target groups in the case of fathers and mothers with respect to age and socio-economic status. Advice on selection was given by the community health workers associated with the PHC program of Aga Khan University, by a retired teacher and resident of Orangi who acted as Urdu-English interpreter, and by previously interviewed informants. The interviews were semi-structured; a list of open-ended questions, which had been pre-tested on routine household visits, was used as interview guide. The general version of the interview guide was modified for fathers and for mothers, emphasizing their personal experience. A protocol was prepared for each interview, including age, sex, occupation, number and age of children, special personal or professional relation to the topic and observations during the interview. Notes were taken during the interview and completed immediately afterwards. Interviews in Urdu were conducted by the researchers with the help of the interpreter who was also involved in the review of the notes after the interview.

Focus group interviews with fathers

Three focus group interviews were conducted in Orangi, two within the AKU field site and a third in Orangi-Mominabad, an adjacent area with a similar socio-economic profile but not yet covered by the PHC program. Selection criteria were (1) being a father of an under-five child, (2) being a resident of Orangi (3) being no close relation to another participant, as recommended by Krueger (1988: 27-48). The interview guide for focus group interviews was based on the previous experience with key informants.

Contacts with potential focus group participants were arranged through the interpreter, members of the Orangi PHC team and previous key informants. The focus groups were conducted either in the house of the interpreter or in a class room of a secondary school.

Participation ranged between six and eight fathers per focus group; nine of the 21 participants were illiterate, ten had primary and two had secondary education. Occupations included day-labourers, artisans, street vendors, steel mill workers, tailors, office assistants, a shopkeeper, a police constable and an employee of the water department. Eighteen participants belonged to the ethnic group of Mohajirs and one each to Balochis, Pathans and Punjabis, thus reflecting roughly the composition of the population in Orangi.

The focus group interviews were conducted in Urdu and moderated by a sociologist working at AKU. The interpreter and an observer took notes. The participants were asked for

their consent for tape-recording of the discussion; a recording walkman (Sony WM-R55) was used for this purpose. The recorded focus group interviews were translated and transcribed independently by two translators; in the case of conflicting translations, the moderator listened to the tapes again and confirmed the correct translation. These translated transcripts were analysed according to (1) number of similar statements in all focus groups, (2) number of similar statements in each focus group separately, (3) time spent on the specific topics, (4) whether the issue under discussion was controversial or concurrent and (5) emotional involvement of participants according to the observation protocol.

Group interviews in lane meetings with mothers

As part of the Primary Health Care program, community health workers and other members of the team conduct so-called lane meetings, regular group discussions on health issues held in private houses. Two group interviews in lane meetings were conducted, lasting 20 and 30 minutes; the first meeting was attended by six mothers between 20 and 35 years, the second by five mothers between 25 and 35 years. The interview guide concentrated on fathers' participation in child care and family decision-making on child health issues. Notes were taken during the interview and reviewed afterwards. As male involvement would have been insensitive in the socio-cultural environment, the female moderator took notes during the interview. These were completed and reviewed immediately after the interview.

Group discussion with community health workers on preliminary findings

The 13 community health workers are all Orangi residents and each cares for an area of 100 to 130 households which they visit at least once a month; these visits provide them with a unique insight in a wide range of families. They are all literate; their work indicates that they themselves do not strictly follow *purdah* and it provides them with their own income. Thus they represent a rather self-conscious and father-critical subgroup of Orangi women.

Feedback and discussion of preliminary results with information providers has been recommended as a means to enhance validity in qualitative research (Southern Community Health Research Unit 1991). A summary of preliminary findings was translated into Urdu and given to all the health workers, who were asked to comment on these individually in writing; subsequently, the preliminary findings were reviewed in a group discussion with them all. All comments were noted and included in the final analysis; results are specifically mentioned in areas where they provide additional information or modify information from other sources.

Observation

Father-child interaction and fathers' child-care-related activities were the focus of semi-structured observations. Observation sites were streets, places and bazaars of Orangi; houses visited for interviews; premises of private doctors; and the PHC centre of AKU. Four afternoons and evenings from 4 pm to 8 pm were spent in Orangi to observe fathers taking out their children, carrying them and entertaining them. The occasion of conducting interviews in homes with fathers or in their presence was used for observations in the households. Observations in the premises of two private doctors focused on the accompanying caregiver of sick children. The PHC centre was checked for male visitors and their reasons for the visit.

Results

For the sake of clarity and to avoid repetitions, the findings are presented as follows: definition of the fathers' role in child rearing; fathers' concept of child health needs; and fathers' participation in child care and related decision making.

Fathers' role in child rearing

'We are the backbone of the family' was the answer of a 52-year-old father of nine children. Fathers define their role in the first place as breadwinner and resource provider for the family's basic needs with emphasis on nutrition, housing, medical care and education.

Fathers are in particular responsible for the psychological and mental state of their children and the harmony within the family. A reason mentioned frequently for the father's key role in this respect is that he has to mediate and balance the relationship between mother-in-law and wife.

Fathers feel emotionally close to their children and the stated aim of many of their activities is 'making the children happy'. Child care is considered to be primarily the mother's task, particularly with small children, but fathers also take part in it: 'the mother plays the primary role in child development but father's role cannot be ignored'.

Fathers stated repeatedly that the health of their children is a major concern to them: 'Sometimes, when our children suffer from any health problem, we feel that we suffer from the same disease'. Emotional attachment to daughters and to sons was reported to be similar in general; some said there may be slightly more attachment to a daughter as she is the one 'to be lost' to another household after marriage.

Important paternal tasks beyond breadwinning include setting a good example and teaching: 'A child learns many activities by imitation. So a father should set a good and healthy example or model for his child'. 'A father is responsible for his child's manners and habits'. Fathers have to introduce the children to the religious life like regular praying at the age of four. They should create a good emotional and mental environment by giving love, affection and attention to their children.

Mothers and health workers confirmed this task allocation. In addition mothers expect their husbands to express concern by asking after work about the children's condition, and they appreciate this sign of concern. They emphasized that earning the family's livelihood is already in itself a big job and a contribution to the children's future.

Fathers' concept of child health needs

In the context of child health needs the major concerns in all focus groups were physical environment: cleanliness, water, sanitation; food and nutrition; poverty; diseases; and social and emotional environment. Key informants revealed similar priorities as shown in Table 1. Separate sections will later expand on these areas of concern.

Table 1
Determinants of good and of poor health for children as mentioned by the 16 key informants

Determinants of good health	**Number of mentions**
Good food	11
Cleanliness, good sanitary conditions.	9
Job, earnings, money	6
Education.	5
Parents' loving care, harmony in family	5
Affordable and accessible health care	3
Regular, scheduled daily activities	3

Table 2 continued next page

Table 1 continued
Determinants of good and of poor health for children as mentioned by the 16 key informants

Determinants of poor health	**Number of mentions**
Uncleanness, impurity, filth	11
Bad, impure food	8
Poverty	6
Diseases	6
High doctors' fees	4
Coldness of environment and food in small children (humoral concept)	4
Evil eye and evil spell (locally *nazar*, *jadu*, *saya*; traditional concepts)	3

Physical environment

'We have dirty and filthy surroundings, which cause diseases, you know, dirt itself is a disease'. 'This filth and dirt has ruined our lives'. 'I think cleanliness is the main problem'.

These statements from each of the three focus groups illustrate the unanimously expressed concern about the physical environment. Bad drainage and filthy stagnant water lead to mosquitoes and malaria, diarrhoea, typhoid and skin diseases and 'cause germs everywhere'. Water supply is not clean: 'even after boiling there is a lot of mud'. Dirty air is mentioned as a cause of cough.

All focus groups reported activities to improve the environment by organizing self-help initiatives for garbage disposal and improving the sewerage system as well as appealing to the local authorities to improve sanitation. The Orangi Pilot Project has played a key role in initiating and organizing these activities.

Food and nutrition

'It is very true, if cleanliness and proper diet are available, the whole family would enjoy good health'. 'It is due to impurities of diet that children suffer from diseases'.

As seen in these quotations, it is the concept of cleanliness and purity rather than the idea of a mixed and balanced diet in a scientific sense, which makes food such a big issue. Adulterated food, impure food, rotten meat and vegetables and locally made sweets and toffees which are sold in the streets are mentioned as examples of bad food. As pointed out by a focus group participant, milk packaged neatly at the dairy may be regarded as cleaner and

therefore superior to the milk sold locally from big containers. Milk is considered to be an essential constituent of children's diet. Regular feeding according to a fixed schedule is recommended by all focus groups. Total lack of food or starvation was not mentioned as the main problem, rather the prohibitive prices or the unavailability of good food.

Poverty

'A poor man can only think and say something, but due to his financial problems can't act according to his wishes'. 'Poverty is our main problem, a poor man can't afford rich food and an ideal environment'. 'Poverty is a curse!'

Similar comments were made in all focus groups. Poverty is seen to be related to most child health problems: poor environment, poor nutrition and family life and health care problems. High doctors' fees and hospital charges are a common concern. They cause sometimes prolonged trials of self-treatment and hospitals seem to be reluctant to treat poor patients as we were told in the second focus group in Orangi:

> When we take them to A... Hospital, they refer our kids to C...Hospital or J...Hospital and when we reach there, they refer our children to A...Hospital again. In this [confusion] our children sometimes lose their lives, too. So you see, this situation makes us depressed and helpless.

The lack of support from local authorities and government institutions is also perceived to be related to poverty.

Diseases

Diseases, perceived as a threat to child health, are presented in Table 2.

Table 2
Diseases perceived as dangerous for children by key informants and focus groups

Diseases	Number of mentions by key informants
Diarrhoea	13[c]
Pneumonia	10[c]
Fever	9[c]
Polio	6[b]
Typhoid	5[c]
Measles	5[b]
Smallpox (locally *chechak*)	5[b]
Malaria	4[b]
Accidents, injuries	4[a]
Tuberculosis	3[b]
Whooping cough	3[a]
Common cold	2[b]
Vomiting	2[b]
Marasmus (locally *sukha*)	2[a]

Note: emphasis given by focus groups: [a] concern; [b] great concern; [c] extraordinary concern

Diarrhoea, particularly when accompanied by vomiting, is unanimously regarded as most dangerous, followed by pneumonia and fever. These priorities match well with AKU data on morbidity and mortality in Orangi. The importance of the modern health sector is evidenced by a high doctor-population ratio of 1:650 and a survey finding of AKU that in 75 per cent of cases of childhood disease first-line treatment outside the house is sought at the clinics of private doctors.

The surprising appearance of smallpox (locally *chechak*) in Table 2 was investigated further. A child seen on a household visit and suffering from chickenpox was labelled as having *chechak*. In a focus group smallpox was reported to have reoccurred after eradication. (In fact, some newspapers reported this story some years ago.) Smallpox was frequently mentioned as a target disease of the continuing vaccination program. It would appear that the perception of smallpox is a mix of chickenpox and parents' remembrance of the deadly smallpox.

The humoral disease concept of hot and cold plays a dominant role in newborn and young children, particularly in the first 40 days of life, the period of ritual seclusion after birth, called *chilla*. Cold environment or food perceived to be cold, given to the child or taken by the breastfeeding mother, is regarded as dangerous and may cause difficulties in breathing and other problems.

Further ethnomedical models of disease causation discussed in the focus groups were the evil eye, *nazar*, caused by the sight of a malevolent or jealous person; black magic, *kalla jadu*; and bad influence or shadow, *saya*, mediated by malevolent or impure persons. One focus group acknowledged these models and stressed that the evil eye is common and may cause various diseases like fever and typhoid. Beautiful and healthy children are particularly vulnerable. For treatment, seven red chillies are moved around the patient's head and then burned, a procedure called *nazar utarna* which means taking away the evil eye. Protection and cure are also sought from amulets containing verses of the Holy Quran, called *taveez*. Another focus group answered quite differently: 'We are good Muslims and don't believe in magic. We recite our *kalema* (holy prayers and verses of the Holy Quran) to make our child safe from evil influences'. This view was shared by the other participants in this group.

Social and emotional environment

'A child needs due affection and love. He should be mentally and physically satisfied from parents' side'. 'A father gives affection and attention to his child'.'There should be harmony in the family'. 'In order to keep his child healthy, there should be a proper time-table, I mean proper and fixed time for study, for play, for sleep and waking time, and for food'.

These typical statements highlight the main concerns: parents' love and attention, harmony and discipline, 'but no undue strictness'.

Fathers' participation in child care

In this area, children are entitled to have their fathers' attention after his return from work. As far as working hours allow, most fathers will spend some time with their children and engage in activities like playing, taking them out and carrying them around, thus introducing the child to the outside world. Half an hour to two-and-a-half hours are reportedly spent with children daily. Weekend excursions to parks, the seaside and the zoo are popular. Further common activities include soothing a fussing child at night and singing lullabies, preparing food, bathing and giving medicine. Story-telling, cutting nails, rubbing the child's chest with

'Vicks Vaporub', tepid sponging and administering oral rehydration were also mentioned. 'We take the child out for play and recreation'.

'After work in the evening, we help our wives by looking after the child'. 'I take my child to the doctor and administer medicine, I take care even if he awakes at night and try to get him sleep'.

Changing nappies was a particular issue. One father commented: 'A child is father's blood, he should manage everything!'

However, the majority of participants in focus groups and key informants say they cannot do it. Nevertheless, cleaning the child and changing nappies was reported by a considerable minority, 11 out of 47 respondents (23%): five participants of focus groups, three male key informants, one female key informant and two women in lane meetings.

Observation during four afternoons and evenings in the streets, places and bazaars in Orangi revealed numerous fathers carrying their small children: of all children being carried, 131 (75%) were carried by men and 43 (25%) by women. Even in the mother's presence, it was the father who carried the child in the majority of cases: out of the 174 persons with a child, 41 men and 31 women were accompanied by an adult of the opposite sex, assumedly husband or wife. In six out of these 72 cases each partner held a child, in the remaining 60 couples the child was carried by the man in 35 cases (58%), by the woman in 25 cases (42%). Men could be seen playing intimately with their children. Fathers met on household visits for interviews demonstrated their expertise in child care by rocking the child and singing lullabies.

In the case of disease, many fathers bring the child to health care providers themselves. Two general practitioners estimated independently from each other that at least 30 per cent of children are brought for treatment by their father. When visiting their clinics, 27 children (55%) seen there were brought by the mother, 22 (45%) by the father. General practitioners provide the first contact level for the majority of the population and are consulted by 30 to 80 clients per day.

In contrast to the clinics of private doctors, the PHC centre of AKU was perceived as part of a Mother and Child Programme and thus not open to men although this was never stated by the program. In a five weeks period with 176 consultations (about 7 per day), only six fathers entered the premises of the PHC centre: three accompanying their children, three accompanying their wives.

Taking children out is seen as a primarily male activity. Bringing a sick child to a clinic for curative care is a shared task, in which the actual circumstances like severity of symptoms and presence of care-takers determine who is going to accompany the child. The other activities as mentioned above are regarded as assistance to the mother. In this context, the interesting fact was mentioned that in the years before the installation of taps, fetching water was a male task.

Fathers' compliance

While paternal task allocations were little disputed, the actual degree of compliance was a controversial issue. 'I have given the child into the entire care of the mother as I get too tired when I come back from work'. This statement prompted immediate dissent. The fathers working in or near Orangi stressed their care-taking activities; those with distant working places expressed their frustrations about the hindrances to giving their children the due attention because of late return from work and their state of poverty in general. However, there was a general agreement that most fathers in Orangi try their best as far as their living conditions allow.

Fathers' self-portrayal was cross-checked with mothers and community health workers. Building on their experiences from regular household visiting, health workers were the most productive source of information on the extent of fathers' compliance with their role model. They estimated that between 80 and 95 per cent of fathers 'are good fathers' and participate in child care accordingly; they attributed lack of paternal care in order of priority to long working days because of distant working places; poverty; drug addiction; carelessness; and disease of the father. While the first two points are rather general and largely beyond the control of the individual, the increasing importance of drug addiction as a social problem is supported by the observation that the majority of cases of severe malnutrition in Orangi occur in families where the father is a heroin addict. In the context of paternal care several mothers and health workers complained that sometimes attention given by men to their wives compares unfavourably with their concern about the children.

Fathers' role in decision-making on child health issues

Statements on decision-making in families were quite diverse. In order to structure them, they were divided into statements concerning generation dominance, concerning gender dominance and concerning the process of decision-making, as the main hierarchical principles in the families are age and gender. All sources (focus groups, key informants, lane meetings) reveal that the parents have the last say in the majority of families (28 statements); the grandmother was seen in this position by a minority (9 statements). 'We have to obey my mother'.

Core comments from focus groups on sex-roles in decision making were: 'In our society this is decided by the male members; however in case of emergency the mother takes the child to the nearby doctor'. 'Because we don't stay at home all the time, our ladies know what to do and where to take the child'. 'No need of permission, it is a matter of my child's life and she is not going to a wedding party, she is going to save my child's life, so no permission is necessary'.

All options ranging from the father as dominant decision-maker to joint decision-making and to woman's dominance were mentioned by all sources, but both men and women stressed the role of their own sex. Two interacting concepts emerge: first, males are generally regarded as the ultimate authority in the family; however, females are regarded as the family child health experts. A key informant, working in the field of community development, described the situation: 'Fathers think they decide, but women do'. As mentioned by women in lane meetings, fathers' involvement in decision-making depends also on the severity of the health problem and the related costs. In the father's absence, women are allowed to take the child for treatment; beyond that, it is their duty to take action when a child falls sick.

According to most informants, disagreement on health issues is rare, although some say that it is common. When it occurs, it is almost exclusively along generation and not along sex lines. Vaccination is stressed as a controversial issue, in which parents often over-rule grandparents. The community development worker and key informant summarized: 'There is a lot of dynamics in these decisions and it is not purely hierarchical; the conditions force co-operation. Men's role is crucial, their consent and support is needed to achieve any change.'

Discussion

This study reveals clearly defined sex-related priorities: fathers are in the first place resource providers, mothers are the primary care-takers of children, a task allocation found in most societies. However, second-line care-taking qualities of fathers and their proximity to children show enormous cross-cultural differences and vary from almost casual contact to heavy paternal involvement in day-to-day child care (Coltrane 1988). The discussion concentrates on the area beyond mere provision of resources and expands on fathers' concept of child health needs, which is basic to the understanding of their role in child health and to fathers' actual participation in child care.

Fathers' concept of child health needs

The most important determinants of child health in fathers' view are physical and social environment, availability and quality of food, financial resources and diseases. These priorities match well with public health thinking.

Cleanliness-uncleanness and purity-impurity were related to almost any aspect of child health: stagnant and filthy sewage drains, unclean and impure food, impure water and filthy air are all seen as major health hazards. Boiling the water is assumed to be useless, because the muddy sediment after boiling indicates that it is still unclean. Breast milk is appreciated because of its purity.

Although largely in line with modern medicine, the concept of cleanliness and purity goes far beyond the idea of hygiene and contamination with germs. As shown by Mull (1991) in her study on perceptions of marasmus in Pakistan, impurity in itself is seen as the source of evil influences. Evil influences caused by malevolent (and ritually impure) people are believed to be transmitted like infective agents by water and even by air. As indicated in the literal meaning of Pakistan (country of the pure), cleanliness is an integral part of Islamic teaching and traditions (Buschmann 1988: 11-77).

It is assumed that with this cultural background ideas of modern hygiene with all its pathogens were perceived as an addition and reinforcement of the existing pollution concept. Furthermore, this synthesis may be the reason for the outstanding emphasis given to cleanliness and purity. It may partly explain the success of the Orangi Pilot Project in mobilizing and organizing the people for the construction of underground sewerage pipelines in a self help and self financed program, an undertaking that in its beginning was regarded as impossible by donor agencies (Mubarak et al. 1990; Khan 1991).

Fathers' participation in child care

The observation that infants, seen in the street, are often carried by men comes as a surprise to many foreign visitors to Pakistan. In other cultures this is a rare event and, as in large parts of Africa, one would expect a woman to carry two children rather than a man to carry one child. As pointed out by Hewlett (1991), carrying is quite a good measure of the father's level of infant involvement, because the father is actively engaged and expending energy on the infant instead of using it in other activities. Our observations of fathers' child-holding even in the mother's presence support the fathers' stated closeness to their children. According to the task allocation of fathers found in Orangi, levels of involvement depend on the quality of the activity. Taking the child out and related activities, as well as religious education, appear to be genuine paternal tasks. Fathers share also a large part of the responsibility for the children's mental well-being and their education towards becoming responsible members of the society. Related activities are comforting, playing and ensuring a reasonable degree of discipline. Day-to-day child care like feeding and cleaning as well as care for the sick child is

regarded primarily as the mothers' task; fathers' activities in this area are seen as assistance to the wife. A similar pattern was found in industrialized countries (Bax, Hart and Jenkins 1990: 161-162): 'Fathers' time is more likely to be spent playing than on other caretaking tasks (such as feeding or changing nappies)'. However, it is not taboo for Orangi fathers to do so under special circumstances such as when the child falls ill. Among the factors which contribute to this level of paternal involvement, the tradition of female seclusion, *purdah*, and its influence on the division of labour among spouses appear to be prominent. The restriction on women's movement in public may be the origin of the paternal task of taking the child out. Many activities, defined as female in other cultures, such as shopping or fetching water are shared with or passed on to the men; in fact, in some parts of Pakistan, office hours are arranged in such a way as to allow the employed men to do the shopping before going to work (Papanek 1982). The great emphasis on children and family life in Islamic culture (Papanek 1982; Buschmann 1988) may enhance the priority for spending time with children compared to other competing activities. The transition process in the deprived urban environment interacts with this traditional background. This is particular evident in the area of decision making, where conditions force a high level of co-operation between spouses. Further research is needed in this area.

Limitations

Bias may have been introduced by translation. In order to minimize it, the taped focus group interviews were translated independently by different translators. The selection of informants was not at random but purposive; therefore, the views of the less articulate section of the population may not have received the due attention and dysfunctional fathers may have been excluded. Knowing our interest in child health may have induced some fathers to exaggerate their role. However, there was a serious effort to control these biases by triangulation, using information from other informants like mothers and CHWs, from a document review and as far as possible from observation for cross-checking.

Regarding the fathers' concept of child health the main researchers' background as medical professionals and their relation to the Primary Health Care program of Aga Khan University may have caused reluctance to elaborate on traditional disease concepts. Regarding fathers' participation in child care a methodological problem emerged, because caretaking activities could be observed systematically only outside the home, in public places and in doctors' premises. The main source for cross-checking fathers' statements on activities at home were women and community health workers. These workers were a particularly valuable source, because through their regular and systematic visits they gain insight in all households in their assigned areas. Problem families like those with malnourished children are particularly well known, because they are visited more intensely and frequently.

The study cannot claim to be representative of Karachi's squatter areas in general because of the great diversity in ethnicity, religion, infrastructure and socio-economic conditions. The situation in rural areas is even more different. According to the importance of fathering and the lack of knowledge about it, future research is needed particularly in rural areas as fathers' co-operation may be even more crucial because of the unfeasibility of home-based interventions and stricter female seclusion.

Conclusions

From our research, it appears that Orangi fathers are physically and emotionally close to their children. They highly value the family in general and children in particular. Beside their expected role as resource providers and allocators they are important second-line caretakers and key persons in decision-making on child health issues.

The primary objective of this study was to provide baseline information on paternal care. However, even at this stage we can draw the following conclusions which affect policy.

First, it seems that fathers are an underused resource for the improvement of child health: the low status of women in general and low female literacy have been related to Pakistan's high infant mortality (Martin et al. 1983; Sathar 1987; Thaver, Ebrahim and Richardson 1990; Dharssi and Rutherford 1992). So there is a rationale behind the established MCH concept and its focus on the mother as key to the child's well-being. However, there is no reason to exclude fathers at the same time. This may be true for most societies; it is all the more true for the religious and socio-cultural environment found in Orangi, where fathers' involvement in child care is related to the tradition of *purdah* and the resulting paternal task allocations. Furthermore, fathers' education has also been shown to enhance their children's health status (Thaver et al. 1990; Dharssi and Rutherford 1992). Under these conditions, a 'mothers only' approach of health services lags far behind social reality. It leaves a powerful resource for child health untapped as male involvement in child care is not a reason for the socio-cultural restrictions to women, but rather a coping mechanism with these restrictions and an additional support. This situation calls for a two-pronged approach to child health promotion involving fathers and mothers.

Up to now, the Primary Health Care program in Orangi has pursued a mother-centred MCH approach but the established centre-based service delivery was replaced by household-based services. This intervention has increased the coverages in preventive MCH care. Salaried community health workers through household visits compensate for the restrictions on their fellow women's mobility. While this intervention has helped to improve MCH care, it is not a long-term solution. It should be accompanied by an effort to address and involve fathers with the aim of enabling parents to jointly manage preventive child care as they do in other essential household functions like shopping and care for the sick child.

Secondly, the father should be accepted and developed as a partner with the health service providers for the improvement of child health: a high degree of agreement between perceived health needs and professionally defined needs is a precondition for the acceptance of any health program and eventual participation in it (Banerji 1986). There is a remarkable coherence between fathers' and professionals' view on the importance of many diseases like diarrhoea, pneumonia, measles and polio, as well as on vaccination as a means of protection. Other areas like nutrition, physical environment and sanitation are common concerns, but the underlying concepts are different. The biomedical concept of disease causation by no means reaches the scope of the prevalent traditional ideas of cleanliness and purity, summarized here as pollution concept, which is closely linked to Muslim culture. However, there are more similarities than contradictions between the biomedical and the pollution concept, the idea of an infective agent being a prominent feature of both. The traditional pollution concept with its emphasis on personal hygiene contains many ideas of public health. Another prominent concern of fathers, their state of poverty, is not denied as a cause for ill-health by health professionals; however, most child health programs do not include or are not linked with activities to reduce poverty.

Finally, the standard approach to child health as promoted by international bodies often does not respond to local needs. The fact that fathers put pollution in its broadest sense and the problem of poverty, both of which affect the family as a whole, on top of the agenda in the context of child health, brings us back to a major observation raised in the introduction;

this is the low acceptability of established MCH services and their inappropriate design. The study highlights two dimensions of the present narrow approach to MCH and the related disadvantages: the first is the narrow definition of the target population, as a result of which fathers are excluded from MCH programs. The second is the reliance on a set of internationally standardized interventions rather than on health problems and related solutions in the local context. After more than a decade of investment in MCH programs with relatively little success, new thought should be given to a re-design starting from existing child care practices. This study has established that fathers contribute to child care. Further studies are needed to develop and test appropriate interventions in a participatory approach.

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Health Transition Review 5, 1995, 207-222

The cultural, social and attitudinal context of male sexual behaviour in urban south-west Nigeria*

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Abstract

From 1989 onward a research program based at Ondo State University, Nigeria, investigated the social and behavioural context of the sexually transmitted disease and AIDS epidemics (Orubuloye et al. 1994). Between 1989 and 1993 the researchers reached the conclusion that premarital and extramarital sexual activities were on a sufficient scale in Ondo State to maintain an STD epidemic and possibly to maintain an AIDS epidemic. The reason for caution with regard to AIDS arose from an awareness of the current relatively low seroprevalence levels in Nigeria and the demonstration by the program that much of the premarital and extramarital sexual activity was not with prostitutes but diffused more widely. The researchers also concluded that the economic returns to young women from commercial sex were so substantial and the current and later social sanctions so weak that no government intervention was likely to reduce the inflow of recruits to the occupation sufficiently to stem the STD epidemic or reduce the risk of a major AIDS epidemic. Clearly something would be achieved by a program aimed at increasing the practice of safe sex, especially the use of condoms, by everyone participating in sexual networking, particularly prostitution. There was little evidence that specific planned intervention was already achieving much, although some evidence that government and media AIDS publicity was raising the level of condom use in prostitution. There also seemed to be a need for STD education and curative interventions on a much greater scale. Nevertheless, until the achievement of decisive biomedical breakthroughs to halt the AIDS epidemic, the research increasingly suggested that the best chance of halting the AIDS epidemic and mitigating the impact of STDs was a change in male sexual behaviour.

There was much confusion and ignorance about how difficult such a change would prove to be, and whether long-term or short-term changes were under way and in what direction. Researchers had raised the issue of the role of sexual behaviour in sub-Saharan African societies, but much of the focus had been on female sexuality (Goody 1976; Caldwell, Caldwell and Quiggin 1989). AIDS researchers had necessarily become concerned with male, as well as female, behaviour. Reporting on Ghana, they had written:

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* This research was carried out as part of a joint program begun in 1989 between the Centre for Population and Health Research, Ondo State University, Ado-Ekiti and the Health Transition Centre, Australian National University. The program was funded successively by the Australian National University, the Rockefeller Foundation and SAREC (the Swedish Agency for Research Cooperation with Developing Countries). This pilot project was funded by SAREC. Jeff Marck explored the work of the classical anthropologists, and the paper benefited from the assistance of Wendy Cosford, Pat Goodall and Jacob Oni in Australia; and Kemi Oguntimehin and Toyin Sadiq, in Nigeria.

> Traditionally, a man in Ghana has unlimited sexual freedom both in and out of marriage while a woman is expected to stick to only one partner at a time... This is in keeping with a situation in which a man can be the husband of several wives, but a woman is a wife to only one man (Anarfi and Awusabo-Asare 1993: 30).

With reference to the predominance of males in migration streams, Anarfi (1993: 47) wrote: 'This, coupled with the repetitive and overpowering nature of the sexual appetite in males, creates the conditions for prostitution'. It seems plausible that the existence of a high level of polygyny inevitably implies — and is justified by — the doctrine that males, by their nature, need more than one woman. This is not a trivial argument in West Africa where usually 40-50 per cent of currently married women are in polygynous marriages (Lesthaeghe, Kaufmann and Meekers 1989: 276). In Ondo State, where the research reported here was carried out, the level is 46 per cent for all women, 62 per cent for those 45-49 years of age, implying that most women are in polygamous marriage at some stage of their lives, and 40 per cent even in urban areas (Demographic and Health Surveys 1989: 12).

Yet there has been almost no systematic study of African societal attitudes to male sexuality to ascertain traditional mores or how they have changed with the advent of Islam and Christianity. The classical anthropologists shied away from studying African belief systems and attitudes towards male sexuality, sometimes implying that it was an improper interest, but more often appearing to feel that the situation amounted to men doing what they wanted to do in a fairly relaxed society in sexual terms, with both sexes driven by little more than physiology. Little attention was given to the social and attitudinal context or the belief system. Evans-Pritchard (1974: 10) wrote about a collection of narratives which he had made among the Azande people:

> I must add that I cannot be held responsible for the sexual content in some of the texts. The relationship between men and women is often in part a physical one; and in any case I did not elicit the texts — love-making is a major Zande interest, from one point of view or another, almost an obsession it appears to some.

Clearly there is a need not only to come to grips with the magnitude of male sexuality, but, more importantly, to place it in the context of society's norms. The Ondo State research program has given a quantified dimension to the former during the last few years (Orubuloye et al. 1991, 1992), showing that, in the course of a year, over half of monogamously married men and more than a third of polygynously married men had participated in extramarital sexual relations, and that three-quarters of single males had engaged in sexual activities (Orubuloye et al. 1991: 70). Perhaps too little emphasis was given to the fact that nearly half of the monogamously married men and a higher proportion of the polygamously married men had confined their sexual activities to marriage. This suggested that both male and female attitudes to male sexuality should be investigated with a view to establishing the constraints that did exist.

The pilot research project

As a prelude to planning a larger project, covering both urban and rural populations, and using both survey and anthropological methodology, a pilot study was carried out in late 1993 in Ado-Ekiti, a town of 150,000 inhabitants and the headquarters of the Ekiti District of Ondo State, Nigeria.

The research program had earlier undertaken detailed mapping of Ado-Ekiti and drew from a stratified sampling framework a representative sample of Yoruba dwellings in which all males and females over 18 years of age were interviewed, aiming at a sample of 500 males

and 500 females. Interviewers administered a questionnaire which included questions which allowed lengthy answers for subsequent study and office coding. The limiting of the research to the Yoruba ethnic group, the indigenous people of Ondo State, was in an effort to understand a single and dominant culture in what was a cultural investigation. Around 88 per cent of Ondo State's population is still Yoruba (Demographic and Health Surveys 1989: 6), as is 93 per cent of that of Ado-Ekiti (Orubuloye et al. 1991:62).

The survey actually interviewed 503 males and 502 females and all subsequent analysis refers to these 1,005 people. Because of some non-Yoruba persons living in the selected dwellings only 97.6 per cent of the respondents were, in fact, Yoruba. Similarly, somewhat fewer 18-19-year-olds were included than had been anticipated. In all other respects the sample conformed with what was anticipated from other data sources. This preliminary report concentrates on the male respondents, and the following were their characteristics. Just over three-quarters were 20-49 years of age and their median age was 37 years. Because Ado-Ekiti is an administrative town and educational centre, one-quarter of the men worked in clerical, administrative and professional occupations, 36 per cent were traders, business men and artisans and 13 per cent were farmers with land beyond the town boundaries. One-ninth had no education, one-quarter primary schooling only, and the rest had experienced at least some secondary schooling. The religious breakdown was 79 per cent Christian, 17 per cent Muslim and 4 per cent traditional African religion, the latter, where it survives, being identified with rural rather than urban life. One-third of the men were single and, among the married ones, 44 per cent were polygynously married, a relatively high level of polygyny but one recorded in Ado-Ekiti in a previous study (Caldwell et al. 1992: 226). In terms of whether commercial sex was likely to be reported, it might be noted that 11.3 per cent of the female respondents reported working in bars and hotels and 5.6 per cent would not be averse to their daughters working in commercial sex providing that it was lucrative.

The questionnaires for men and women were different but contained some common or similar questions. The focus was on male non-marital sexual activity and the reasons given for it. Among married persons an examination was carried out of the extent to which husbands believed their wives were aware of this activity and the actual level of awareness among wives. The extent of protest by wives was ascertained. Finally, parental, especial maternal control, of adolescent sons' sexual activities was investigated.

Is one woman sufficient for a man?

Table 1 provides a selection of responses to this question, from different parts of the interview. Much of the society is certainly no longer convinced that monogamy in sexual life is impossible for men. Over half of men and four-fifths of monogamously married men believe it is possible. Among women the proportion reaches two-thirds, and even a substantial minority of polygynously married women share this view. They may not be wrong, for work in Ibadan suggested that husbands became more sexually interested in their own wives, and more reluctant to substitute sexual activity with other women while their wives were abstaining, when their wives were more educated and more 'modern' in a range of ways, including their jobs (Caldwell and Caldwell 1981: 87; 1987: 244). Admittedly when wives are asked about their own specific case, the number sure that the husband could keep himself to one woman dropped to 42 per cent. In this response the gradient of responses was steep in keeping with the findings from the earlier research, with trust in the husband or in the respondent's ability to retain his interest rising from 21 per cent among the illiterate to 57 per cent among wives with some secondary education, and from 19 per cent among farming wives to 35 per cent among traders and 59 per cent among white-collar workers.

Table 1
The sufficiency to a man of one woman, male and female responses

Question	To whom addressed	Responses	Percentage of all responses
Is one woman sufficient for a man?	Males		
	all	Yes	59
	single	Yes	61
	monogamously married	Yes	81
	polygynously married	Yes	15
Is one woman sufficient for a man over a lifetime?	Males		
	all	Yes	55
	Christians	Yes	68
	Muslims	Yes	23
	traditional religion	Yes	11
Is one woman sufficient for a man?	Females		
	all	Yes	63
	monogamously married	Yes	76
	polygynously married	Yes	41
Do you think your husband could be satisfied with just you for a lifetime?	Wives	Yes	42

In fact, the society is divided with very little common ground: around half of both males and females (varying by the form of the question) arguing that man is by nature polygynous and the rest, often seeking support from what they regard as the Christian viewpoint, denying it. The differentials in response were striking, with the right to more than one wife being embedded in Islam and traditional religion. It should be noted that Christians and Muslims exhibited similar majorities in their view that this male need did not sanction extramarital sexuality.

The belief that one woman is sexually sufficient for a man is more strongly held in modernizing society. Among males it was held by 35 per cent of farmers (all with urban residence), 43 per cent of artisans and 66 per cent of white-collar workers. It was held by 46 per cent of the illiterate but 60 per cent of those who had been to school, with such a small gradient among the latter that it seemed as if the main factor was identification with any schooling. Among females the gradients were both steeper and continual with 33 per cent of farmers, 55 per cent of traders and 78 per cent of office workers believing men could confine themselves to one woman. The figures increased linearly with education, from 41 per cent among those who had never been to school to 69 per cent who had at least some secondary schooling and 83 per cent with tertiary education. There were no significant differences by age, possibly an indication that attitudes are not changing rapidly.

Table 2 demonstrates men's reasons for believing that they could or could not be content with one woman.

Table 2
Reasons that men can or cannot be satisfied with one woman

		Male respondents	
		% answering this way	**% of all respondents**
Why men can be satisfied:	God's way, dignity, control of appetites	34	19
	So as not to injure marriage	30	17
	Health risks of non-marital sex	22	13
	More economical to stay with one woman	9	5
	Not stated	5	3
Why they cannot be satisfied:			
	Polygynous by nature	80	32
	Both men and women polygynous by nature	5	2
	Wife often sexually unavailable	8	3
	Not stated	7	3
No response to original question (in Table 1)			3

The main argument for sexual exclusiveness is that it is a moral, settled way of life. The first two categories were largely argued in religious terms with little difference between Christians and Muslims. Nearly all conversions have taken place this century. Conversions to Christianity were largely to a fundamentalist mission type, and Muslim missionizing has largely been modelled on the Christian experience. Fear of the health consequences of multi-partnered relationships plays only a minor role. The argument for wider sexual networking is that it is unavoidable: men are that way by nature. Those putting this argument did not do so in opposition to Christianity - although they sometimes did so in opposition to how Europeans interpreted their religion - but rather as introducing an additional biological truth. The argument that Yoruba wives are often unavailable for sex because of culturally prescribed periods of abstinence was made less often than anticipated (Caldwell and Caldwell 1977; Page and Lesthaeghe 1981), possibly because these periods are shortening. Nevertheless, this is surprising because, as women become older, both sexual activity and co-residence often cease in Yoruba marriages. The proportion of marriages so affected may be gauged by the fact that the 1990 Nigerian Demographic and Health Survey recorded that 19 per cent of Southwest Nigeria's households are female-headed (p.12), and by the time women are in their forties almost one-fifth are having no sexual activity (p.64).

Are men biologically different in their needs?

Nearly half of all male respondents and over a third of female respondents believed that men would or could not give up seeking other women. We tested this further by asking direct questions on this point.

Table 3
Men's physical need for more than one woman, male respondents

Question	Response	Male respondents (%)	Female respondents (%)
Do men have a need for more than one woman?	Yes	41	37
Do you personally have such a need?	Yes	37	
Are males biologically different from women in their need for different sexual partners?	Yes	46	

The affirmative answers for males being different and being biologically driven declined from 61 per cent among illiterate men to 33 per cent with post-secondary education, and there is a similar gradient from farming to the socio-economically higher urban positions. The declines were even steeper among women, from 59 per cent among illiterates to 17 per cent of those with post-secondary education, and from 67 per cent among farmers to 22 per cent of clerical workers.

Those believing men were biologically driven divided into two equal halves: those who believed that the fundamental force was men's strong sexual urges and the need for their immediate satiation, and those who felt less strongly about the overwhelming need for sexual activity but believed they were driven by a need for a variety of partners. Among those who denied that sexual networking arose from biological causes, all said in one way or another that Yoruba society encouraged male sexual adventurism and placed few sanctions upon it, so that men just used the licence provided to them to enjoy themselves.

The male respondents' sexual behaviour

The 334 married male respondents were asked when they had last had extramarital sexual relations. Somewhat unexpectedly in view of the previous responses, not a majority but only one-third stated that they had not. However, for many it was not a regular event and only 39 per cent had done so in the current year and 20 per cent in the current week. Believing that male sexual networking was inevitable and having extra partners were highly correlated. Nevertheless, there was not the same socio-economic correlation with behaviour as with attitudes. The fact of having extramarital relations was not significantly related to education and only marginally to occupation with white-collar workers having indulged only slightly less than farmers or traders. The more educated and economically better-off are more likely to speak against sexual networking but not more likely to refrain from it. They may also have more opportunity and be in a position to afford it.

Those who had experienced extramarital sex were asked about the most recent episode. It is clear that much of this sexual activity was unsafe. Although only a few identified the female partner as having been a prostitute or stated that they had gone to a brothel, hotel or bar for sex, 48 per cent of the encounters were with women who were either prostitutes or unknown to the men, or could not be properly identified, and 43 per cent involved some payment at the time. Only one-third of the men used a condom at that encounter, but two-thirds felt fairly safe; 32 per cent were apprehensive of catching a disease. Those who felt safe usually gave as their reason that they knew the woman not to be promiscuous and to be selective with her partners; although previous research in the project has shown that men know far less about their non-marital female partners' other relationships than most believe (Orubuloye et al. 1992: 346-347). A few explained that they regularly took antibiotics or had medical checkups.

These men were asked two further questions: what had led to the sexual episode, and what had been their subsequent primary reaction to it? In terms of the first question, six per cent said that the wife was away, one per cent that she was abstaining from sex, and five per cent that they were with a group of friends and went along with them. But all the rest spoke of sudden desires or urges, mostly alone although sometimes after drinking. Afterwards, 54 per cent felt happy and stronger, 25 per cent were sad and guilty, and 20 per cent were chiefly concerned that they might have been infected by an STD or HIV/AIDS.

Further questions focused on those men who believed that they were at some health risk from their extramarital sexual relations. Only one-fifth even now fear AIDS. Everyone fears STDs, although, with few exceptions, only gonorrhoea was specified. Most claimed that because of recent publicity or their own fears (or perhaps just because they are growing older), they are taking greater precautions than used to be the case. Among this group, 55 per cent use condoms more often, 24 per cent have more frequent medical check-ups, ten per cent take more antibiotics, and eight per cent more herbal medicine. Only four per cent have changed the pattern of their sexual behaviour. It might be noted that national and international programs have made it much easier and cheaper to obtain condoms than was the case even three or four years ago (Caldwell et al. 1992: 224-225).

Only one-eighth of the male respondents admitted to frequenting brothels, bars and hotels. Of this group, 73 per cent said that their decisions on the last visit were affected by having too much to drink, and 63 per cent that they were afterwards afraid of the health consequences of the sexual relations that had followed, although half said they had used condoms. Over half went to the brothel, hotel or bar on the spur of the moment, and only a quarter had set out with that specifically in mind.

The role of wives

There is evidence that the Nigerian system of extramarital sexual relations operates as it does, not so much because almost half the society thinks that the male need for sexual diversity is uncontrollable, but because a much larger proportion of society believes that wives have no right to comment upon, or even take note of, husbands' absences at night, or the fact that they are probably involved in sexual activities (Caldwell and Caldwell 1981: 86-88; Orubuloye et al. 1992: 348-349). In a study of Ondo Town, nine-tenths of those husbands conducting extramarital sexual relationships said that their wives knew nothing about it even though in the majority of instances these actions were discussed with relatives or friends. The research concluded:

> Even though wives' ignorance of their husbands' extramarital relations is largely ritual and pretence, the fact is that they do not inquire about nor often discuss these matters with their husbands (Orubuloye et al. 1992: 349).

In research two decades earlier in Ibadan, it was found that women so strongly adhered to this stance that the great majority refused to tell interviewers whether they suspected any particular women or who the women were (Caldwell and Caldwell 1981: 87).

This situation has not changed, as is shown in Tables 4 and 5, where the focus is on male beliefs about their wives' suspicions and on male reporting of their wives' interventions. As subsequently noted, a much higher proportion of wives are actually aware of what is going on, but, as reported in the following section, husbands and wives agree that the latter rarely intervene. It is this which allows husbands to believe, or at least keep up the pretence that they believe, that their wives do not know of their extramarital adventures and hence are not disturbed by them.

Table 4
Wife's awareness and reaction to the extramarital sexual relations of husbands (N = 220)

Question	Response	Percentage of subcategory	Percentage of all husbands who had extramarital sex
Is your wife aware of your extramarital sexual activities?	YES		14
	NO		70
	Don't know		16
If aware, has she said anything? (N = 30)	YES	40	5
	NO	47	6
	No response	13	2
What did she say? (N = 12)	Immoral, disloyal	42	2
	Lack of self-control	17	1
	Danger of infection	8	0.5
	Don't know	33	2

Few wives say anything, and fewer still raise the issue of the risk of disease to their husbands and themselves. The use of the filter question about awareness of specific activities may well have reduced the levels of reported reactions by wives. To counter this, a wider question was asked later in the interview to ascertain whether male respondents could recall their wives ever having raised the question of their extramarital sexual activities. The responses appear in Table 5.

The striking point about both tables is how little control wives have over their husband's extramarital sexual activities and how rarely they try to exert any control. Even Table 5 shows that, of those wives whose husbands do engage in extramarital sexual activities, fewer than one-fifth have ever said a word about it. Furthermore, in only one-fifth of these cases (4 per cent of the total) did the husband promise to restrict his sexual activities to marriage, although a slightly greater number decided to be more careful about avoiding sexually transmitted diseases. Clearly wives play little part either in controlling their husbands' extramarital sexuality or in inducing the practice of safe sex. What is more surprising is that there is very little gradient by education or occupation in the responses. Educated wives working in offices, with the ability to support themselves fully, are hardly any more likely than farmers' or labourers' wives to make a complaint. To do so would be to strike at the heart of the family and social system.

Wives are, not unexpectedly, more aware of the situation than husbands say. Even by the highest count, only 19 per cent of sexually straying husbands report themselves as having been given reason to think their wives suspected. In contrast, 70 per cent of such wives reported their suspicions to interviewers in the special circumstances of a research interview, and the actual proportion harbouring suspicions is undoubtedly higher still. The majority of the more traditional wives just take it for granted. Those believing their husbands to be having outside sex declined with education: 60 per cent for those without schooling, 47 per cent with primary schooling, and 15 per cent with secondary schooling or more. Similarly there was a decline from 67 per cent for farming women to 48 per cent for traders and 13 per cent for white-collar workers. It might be noted that these are far steeper declines by socio-economic status than the facts warranted, and the inevitable conclusion is that higher-socio-economic-status wives delude themselves to a greater extent or are forced to a greater extent

to preserve their marriages by denying the truth even to interviewers. Interestingly, only seven per cent of the wives of straying husbands believe their spouses ever go to prostitutes. Both wives and husbands share the difficulty of defining prostitution.

Table 5
Discussions about husband's extramarital sexual activities (N = 220)

Question	Response	Percentage of subcategory	Percentage of all husbands who had extramarital sex
Has your wife ever said anything about your extramarital sexual activities?	YES		19
What did she say? (N = 41)	Immoral, disloyal	22	4
	Lack of self-control	12	2
	Danger of disease	49	9
	No response	17	4
What was your reply? (N = 41)	Not wife's business	27	5
	Society allows it	5	1
	Knows how to avoid disease	24	4
	Will not in the future	20	4
	No response/said nothing	24	5
Did your wife's complaints influence you? (N = 41)	YES	46	9
	NO	44	8
	No response	10	2
If YES, in what way? (N = 19)	Practised extramarital sex more safely	63	6
	No response	37	3

Wives' and husbands' rights

Table 6 reports on how all men, not merely those engaged in extramarital sexual activities, interpret the sexual rights of wives and husbands.

Almost half of all men believe that husbands do have a right to extramarital sex. Even many who do not, believe that good wives should not enter this sphere. There are two

arguments for this. The first is the traditional cultural or natural right of men to express their essentially polygynous nature. The second, and more unexpected, is a kind of moral argument for the double standard. Proper women or good women do not notice sexuality, even their husbands' extramarital sexuality. Indeed, traditionally the proper woman was not supposed to demonstrate much sexual excitement within marriage either.

Table 6
Wives' and husbands' rights

Question	Response	Percentage of subcategory	Percentage of all husbands who had extramarital sex
Male respondents (N = 502)			
Does a wife have a right to disapprove of her husband's extramarital sexual activities?	YES		24
	NO		64
	No response		12
If YES, why? (N = 120)	Marriage gives this right	32	8
	She must try to maintain the marriage	19	5
	She must try to reduce the risk of STDs and AIDS	36	9
	No response	13	2
If NO, why not? (N = 321)	If women judge these matters, they might believe they too have rights to extramarital sexuality	33	21
	Unseemly, immoral, against God's commandment for a woman to notice these matters	21	13
	Husband's right as head of the household	17	11
	No response	29	18

Table continued next page

Table 6 continued
Wives' and husbands' rights

Question	Response	Percentage of subcategory	Percentage of all husbands who had extramarital sex
Do husbands have a right to have sex with other women without their wives interfering?	YES		46
	NO		45
	No response/Don't know		9
If YES, why? (N = 233)	Natural right, cultural right, marital right	99	45
	No response	1	1
If NO, why not? (N = 226)	Wife's marital right	9	4
	Wife's duty to try to maintain marriage	42	19
	So she and her husband can avoid disease	22	10
	Not stated, don't know	27	12
Female respondents (N = 483)			
Does a wife have the right to disapprove of her husband's extramarital sexual activities?	YES		27
	NO		73
	No response		-
Does a husband have a right to extramarital affairs without his wife interfering?	YES		48
	NO		52
	No response		-

It is clear that neither men nor women see the rights of the sexes as complementary. Only a quarter of both men and women believe that women have a right to disapprove of their husbands' behaviour. But nearly half of each sex believe that husbands have no right to get away with extramarital sex without some trouble or disapproval. This may seem to be contradictory but it is not. What is meant is that the decision-making and the self-constraint should lie with the husband. He is the head of the household and he should control himself.

The belief that a wife has the right to disapprove of her husband's sexual activities rises among males with education and socio-economic status but, surprisingly, does not do so among women. Similarly, the belief that a husband has a right to extramarital sexual adventures without interference falls among men as education rises, while, though the direction is similar among women, the gradient is much less steep. Educated women are much more realistic than educated men about the price of maintaining a marriage.

Parents' rights and sons

The research program discovered that there are generational rights as well as gender ones. Society allows mothers to try to exert more control over sons than it allows wives to exert over husbands, although as Table 7 shows, with even less impact. Earlier research (Orubuloye et al. 1991: 70) had shown higher levels of non-marital sexuality among single than married males and it appears that this is more condoned by society, thus undermining parental attempts at control. Both research projects showed similar levels of sexual activity among single males.

Table 7
Parental control of the sexual activity of their adolescent sons, female respondents (N = 98)

Question	Response	Percentage of responses in subcategory	Percentage of all respondents with adolescent sons
Do you think your son is sexually active? (N = 98)	YES		80
	NO		18
	Don't know		2
Do you say anything to him? (N = 78)	YES	76	60
	NO	24	20
Does his father say anything to him? (N = 78)	YES	69	55
	NO	17	13
	Don't know	24	5
Does your son take any notice? (N = 78)	YES	64	38
	NO	8	5
	No response	28	17
Do you think he ever goes to prostitutes? (N = 78)	YES	12	7
	NO	88	53
Do you ask your son about what he does when he goes out? (N = 98)	YES		74
	NO		22
	No response		4
Do you think a mother should try to control her son's sexual activities? (N = 98)	YES		74
	NO		26
Can you do this? (N = 98)	YES		70
	NO		30

Table 7 confirms that most adolescent sons are sexually active and that the majority of parents attempt some kind of control. This may not be very effective, but it may limit some of the risks taken. Indeed, few mothers believe their sons go to prostitutes. This may be self-delusion but it is true that most of the males frequenting hotels and bars seem to be older men. Ondo Town research suggested that most boys start their sexual activities with girls of their

own age (Orubuloye et al. 1992: 345-346). The attempt to control their sons' sexual activities rises steeply with mothers' education and occupation.

Discussion

Urban, Yoruba society, as represented by Ado-Ekiti, is not a simple case of all men believing that they have unbridled sexual rights both inside and outside marriage and the whole society supporting that view. There is not universal agreement that men's polygynous tendencies, in the sense of one woman inevitably failing to satisfy a man's biological needs, are fundamentally biologically driven and ungovernable.

Certainly in contemporary Ado-Ekiti society, marriages are dichotomized. Possibly up to two-thirds of husbands have been unfaithful to their wives at some time but the proportion who regularly go to other women for sex is probably no more than two-fifths. The proportions are higher among young adult single men, probably well over three-quarters engage in fairly regular non-marital sexual activity. Mothers may be apprehensive but the society does not feel strongly on the matter because marriages are not being endangered.

But there is a substantial proportion of the community, probably a majority, among whom husbands believe that sex should be confined to marriage and follow that advice most of the time. Whatever may have been the original situation and the beliefs upon which they were based, the rationale behind the modern belief in confining sex to marriage is drawn from the world religions to which 95 per cent of Nigerians and 98 per cent of the population of Ondo State now adhere, and in Ondo State primarily to Christianity which is followed by 85 per cent of the population (Demographic and Health Surveys 1992: 19; 1989: 6). The case put for fidelity is partly that an ordered and moral society should have a stable family, but the heart of the case is that this is God's will and, in particular, that adultery is forbidden. Muslim responses were almost indistinguishable from those of Christians.

In contrast, there is the strongly held view, particularly by those males who frequently seek sex outside marriage, that African culture has always recognized the male need for, and right to, multipartnered sex, and that polygynous marriage is only one aspect of societal acceptance of this point. They do not reject Christianity but they do reject what they regard as a specifically Westernized interpretation of Christianity on this point. Nevertheless, they also appeal to the age-old recognized rights of African men in this domain.

In spite of a widespread belief that extramarital sexuality is increasing with time and is associated with urbanization, commercialization and all things 'modern', this is a far too simplistic interpretation. As this research has shown, the more educated and those higher up the modern occupational scale are more likely to believe in keeping sex within marriage. Admittedlly, as yet the behaviour of many does not follow their expressed beliefs. It is in the most modernized sector of society that men have most regretted the unavailability of their own wives for sexual relations during the postpartum abstinence period, and where that period has been most reduced. This is not merely adherence to doctrine, but also the fact that men find educated, well-dressed, lively women more attractive. Some, of course, find additional partners of this type among single, young women who are characterized by the highest educational levels. Furthermore, those who believe in a form of Christianity more adapted to Africa in this regard get very little support from the preaching of Christian leaders, even from the African independent churches which generally do not condone male extramarital sexual relations (Orubuloye et al. 1993a: 123-125).

The weak link in the social control of male extramarital sexual activity is not only the belief system about such relations, but also the continuing powerful belief that women should not even be aware of most male activity, sexual or otherwise, and should not enter into male affairs. Most of the community believe in only a very limited form of companionate marriage, and an insightful study of Yoruba society characterized it as having separate female and male

worlds, rarely intersecting (Marshall 1970). The separate strong links that wives and husbands retain with their own families of origin buttress this system. In the present research it was found that even in marriages where both husband and wife agree that sex should be kept within marriage, wives rarely feel that they can take note of any philandering by their husbands, let alone protest. This confirmed the findings of previous research on this matter.

As yet, there is little evidence that anxiety about the health dangers inherent in husbands' extramarital sexual activities is of central importance in either the wives' or the husbands' own attitudes to these relationships. There are several reasons. One is a widespread belief that STDs, usually thought of principally as gonorrhoea, can strike even when care is taken; and there is little fear of what is a common complaint. Another reason is a high level of ignorance, especially among women, of STD symptoms and whether their spouses are infected (Orubuloye et al. 1993b: 867). Finally, although the government's AIDS messages have been heard by most people, they are unlikely to do much to change behaviour unless there is a significance outbreak of the disease in the Ekiti District, which is not the case.

Parents do not have the same inhibitions in attempting to control their children's behaviour as wives have with regard to their husbands. Most feel it a duty in the case of daughters and have strong backing from society (Orubuloye et al. 1993a: 99). They also have few inhibitions in trying to limit their dependent sons' sexual activities. That they usually fail is explained by the fact that society does not support them very strongly, believing that such activities do not endanger family life.

The research has confirmed other research in finding that, in spite of all these modifications of the picture of unlimited sexual networking, the levels that do exist are quite sufficient to support an AIDS epidemic if other factors also favour such an outbreak. What, then, do these findings support in terms of potential preventive interventions?

There is no doubt that the society still believes strongly that male sexuality is very largely a matter for men themselves. Any campaign to reduce male extramarital sexuality will have to convince men that it is dangerous and unnecessary. In terms of danger, there will be a need if the Nigerian AIDS epidemic intensifies to get the message across about the numbers infected, the significance of the latency period, and the danger of sexual networking. Because far more women are engaged in some form of transactional sex than are usually thought of as prostitutes, men are disturbingly sanguine about their extramarital relations with women they know slightly, and most underestimate the number of other partners these women have (Orubuloye et al. 1992: 348-349).

The likelihood of condom use is increasing but there are two problems. The first is that in institutional commercial sex the increase in use has mostly been the achievement of the prostitutes themselves. The managers of brothels, hotels and bars have been largely inactive in pressing the women and their clientele to use condoms and in providing them (Orubuloye et al. 1994: 113). And there is not much evidence of government pressure on the management to undertake these activities, in spite of the evidence from Thailand that it is probably the most effective way of quickly intervening in the transmission of HIV/AIDS. In Nigeria the most difficult task will be to persuade men to use condoms in non-institutional extramarital sexual relations, since many women 'friends' would be insulted by their use. The necessary condoms are now available in sufficient numbers in Ado-Ekiti and this is to the credit of everyone concerned in the operation.

It will be more difficult to convince many men that they do not have an unquenchable need for multiple female partners. The government and the media can do something in combating the idea that the confinement of sex within marriage and the practice of sexual monogamy is un-African.

In the longer run one way of attempting to limit men's sexual activities to marriage is probably the emergence of a stronger belief by wives that their husbands' extramarital sexual activities are their business too and that they have to intervene to save their health and their

marriage. This is still regarded by most of the community as un-African. Just how difficult this attitude will be to change is demonstrated by the fact that the most educated and highest socio-economic groups hardly differed from the least educated or the poorest in their attitudes and behaviour in this regard. The most effective intervention here would probably be an attempt to change women's attitudes through women's groups, the media and the schools.

Finally, there is the problem of greater family control over the sexual activities of adolescent sons. Parents try to exert control and society supports them. The stumbling block is that society does not deeply disapprove of premarital sexuality. Interventions here will probably have to emphasize STDs and, if the epidemic spreads, AIDS.

There is already substantial support in the Ado-Ekiti community for such interventions to strengthen wives' rights, and government programs may well achieve a worthwhile degree of success. Nevertheless, such success will be most easily achieved in the towns, for this study showed that even farmers living in the town are far less likely to believe that male confinement of sexual relations to marriage is a real possibility. The next segment of this research will show whether this view is typical of rural populations.

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Forum: Health Transition Review 5, 1995, 223 -258

Can health transition research improve health?

Research to support partnerships for public health

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Health improves through social, cultural and material change in three broad and interacting domains: improvements in health care, including personal preventive services; choices of healthier ways of living, choices which are collective as well as individual; and progress towards healthier environments, including safer and more supportive environments. Health transition research has contributed greatly to our understanding of each of these and how they interact.

The institutions and practitioners of public health constitute the main institutional system through which society organizes deliberately for better health. The main way in which health transition research might contribute to society's deliberate efforts to improve population health is through informing the practice of the public health workforce: policy makers, planners and practitioners.

How well does health transition research contribute to public health practice, including policy making, planning, and program and service delivery? How might health transition research contribute more effectively to public health practice?

The epistemological assumptions of the empiricist research tradition, and in particular the vision of a singular truth, limit the wider application of health transition insights in public health practice. The vision of singular truth translates, in the minds of many public health practitioners and policy-makers, to an assumption that their knowledge has a privileged and universal status, the closest approximation to the truth so far achieved. This assumption is an obstacle to building the partnerships which are so critical for the achievement of better health. It is possible to produce knowledge which is constructed in the world view of the citizens and practitioners whose decisions and actions will create the conditions for better health. Such research, more particularistic, more action oriented, might contribute to a more open approach to the building of partnerships in settings of public health practice.

Dispersed agency

Public health practice is not simply a matter of 'implementing' the insights of health transition research (and similar insights with respect to the biomedical determinants of health and ill-health). The levers of change to which health transition research points are largely beyond the direct control of public health authorities.

Progress in each of the three domains listed (services, choices and environments) is produced through the striving and the interplay of different sets of agents. Improvements in health care, including improvements in personal preventive services, are shaped in some degree by the policy makers of public health; however, they are mainly achieved by the managers and practitioners of the health care system interacting with the choices of consumers and carers procuring particular services. Choices of healthier ways of living

likewise are informed by a range of educational activities, including those of the public health system. However, they are largely shaped by the concerns and deliberations of individuals, families, community organizations and social movements, not necessarily theorized in terms of achieving better health. Public health advocacy may contribute to progress towards healthier environments but much of the drive for such progress comes from people concerned in other sectors of social enterprise (transport, economics, agriculture) interacting with the strivings of citizenship manifest at various different levels.

Public health practice involves building partnerships with the other social agents who contribute to shaping the conditions for better health; partnerships with the managers and practitioners of the personal health care system; with personnel of such sectors as transport, economics, housing, urban development, food and agriculture; and with citizens, as individuals, families, community organizations and social movements.

Complexity theory provides a useful language for speaking about 'dispersed agency'. Complexity theory invites us to speak of society as a complex adaptive system, constituted by autonomous but interactive agents, responsive to, but not controlled by, what is happening elsewhere in the system (Waldrop 1992) . Much of the work of public health is collaboration with the dispersed agents who contribute to better health, in particular, with health care practitioners, with the 'other sectors' and with citizens.

Different and incommensurable world views

The strivings of citizens and of institutional members of the 'other sectors' are generally not conceived in terms of achieving better health. The strivings of citizens are more likely to be construed in terms of the betterment of family members (looking after my nephew, helping a family member cope with stress) or in terms of religious duty or the achievement of better working conditions. Such projects are more likely to be 'theorized' in terms of the well-being of family members, doing the 'right thing' and getting a 'fair go', than in terms of an abstract quality called 'health'. The strivings of those in the 'other sectors' are likewise conceived in discourses which are peculiar to those other sectors: business (making better products and making profits); politics (implementing policies and getting re-elected); transport (improving the movement of people and goods); education (preparing children for the responsibilities and challenges of adulthood).

Traditional public health teaching recognizes the importance of these partnerships, although somewhat ambivalently, in the slogans of 'intersectoral collaboration', 'reorienting health services' and 'community involvement'. The concept of intersectoral collaboration refers to the challenge of working with other sectors for policy outcomes and program initiatives which will 'make healthy choices easier choices' and 'create more supportive environments'. However, such activities are often spoken of in terms of 'intersectoral advocacy', suggesting an underlying predisposition to tell 'them' what they should do, rather than opening a field of collaboration.

The slogan 'reorienting health services' foreshadows a situation where the managers and practitioners of health care are more conscious of the population health implications of their work and more confident in working in ways which are more compatible with this perspective. However, the slogan itself, 'reorienting health services', also suggests our primary concern is to tell the health care providers what to do rather than develop a more reciprocal collaboration. The slogan of 'community involvement' points to the need to build partnerships with the communities whose health is at stake. However, it leaves unanswered the question 'involvement on whose terms?'. The goals of public health practitioners in relation to the communities about whose health they are concerned are more often represented in terms of 'achieving behaviour change' than building partnerships. In some cases the project is cast as building partnerships in order to achieve behaviour change.

Singular truth and unproblematized power

One of the important limitations on the effectiveness of the institutions of public health has been in the handling of these partnerships. Further, the epistemological practices of empiricist research, including much health transition research, actually contribute to the barriers to more effective collaboration. In particular, the assumption of singular truth and the unproblematized deployment of power in the prosecution of that truth is a major barrier to the building of partnerships.

In the empiricist tradition researchers discover 'objective' truths, or they strive towards such truths. The empiricist works to build a God's-eye view of reality, a view of the situation as it might be seen from 'the outside'. But what if there is no outside, what if we are indelibly present in the field of which we speak? This kind of empiricism is based in the positivist epistemology which has characterized modernity. There is a singular reality which is theoretically knowable; some knowledges come closer to this singular truth than others and scientific method is the best pathway so far discovered for moving towards such truth. In this schema knowledge is conceived as 'representing' reality, bearing a correspondence relationship to 'things' in the real world. The corollary, that knowledge is somehow not of the real world, is clearly absurd but it is an assumption that has been sustained by the successes of reductionist science and technology. The recursive paradox, of knowledge having a material presence in the field of which it speaks, has been widely recognized as paradox but not taken seriously as requiring any rethinking of the empiricist paradigm.

The burden of singular truth

The possession of singular truth based on best method constitutes a burden upon the public health professional, a handicap which sometimes prevents one from hearing the knowledges which are created within different life worlds. The burden of knowing what is best for other people is a great responsibility; if what they say is inconsistent with what we know is best for them we must discount it, albeit with 'great respect'. Having the power to override other people's judgements is often treated as an unremarkable correlate of knowing the truth, indeed it seems that it is the truth which has the power, not the possessor.

The World Bank (1993) has a view that it knows what is best for people in developing countries. It is a view that is based on a vision of singular truth pursued through best method. The Bank no doubt sees the power of its proselytising as deriving from the power of its analysis, of its truth. However, if we put aside the Bank's assumption of its privileged access to truth, we may see the operations of power more starkly. The truth claims of the Bank and the immense resources which it is able to draw upon to promote its truth may both be seen as instruments of power.

Post-structuralism

Post-structuralist theory involves a number of epistemological shifts; for an introduction see Rosenau 1992. The first of these shifts is a reconception of reality as constructed in language, rather than language simply mediating transparently the truth about reality (de Saussure 1983). The second move is a recognition of knowledge as constructed within discourse, as made up of statements within conversations (Foucault 1972). These statements are seen as emanating from particular positions and settings and contain within them the echoes of earlier discourses. Treating knowledge as constructed in discourse allows us to recognize the presence of knowledge (and the knower) in the field of which it speaks, in the same way as comment-in-action constitutes part of the action on which it comments.

The third shift concerns how we approach the task of integrating different kinds of knowledge in the process of analysing our situation and planning what we shall do. In the

positivist tradition this is conceived as a project of integrating different knowledges into a wider and more general truth: ultimately, the grand unified theory of everything. Post-structuralism, by contrast, reconceives this integration of knowledges as a process of drawing eclectically from a multiplicity of partial and overlapping stories on the grounds of their usefulness for our particular purpose in this particular situation (Lyotard 1984). The epistemological relativism of post-structuralism recasts truth claims as strategies of power rather than truth being a 'natural' adjudicator between competing perspectives. The clearer recognition of power in the field of negotiation suggests the need for closer concern with the conditions in which shared truth is negotiated.

Agency

The concept of 'agency', the quality of being an agent, is useful in this context. The term focuses our attention on who will decide to act, who will choose to act. Caldwell's (1986) emphasis on female autonomy and political participation on the low-cost road to better health identifies the agents whose decisions and actions create the conditions for better health as the Keralite farmers, fisherfolk and traders, including in particular the Keralite women. The knowledge of the World Bank (1993) on the other hand is structured around the perspectives and choices of the Bank, around the agency of the Bank. Knowledges which are constructed around the perspectives and choices of the Keralite grandmothers are absent from the Bank's account of how health improves.

It would contribute usefully to public health practice if more researchers were to orient their research practice around the collaborative creation of knowledges which will inform the practice of the different agents whose decisions and actions shape the conditions for better health. In particular such research should contribute to the development of knowledges which are structured around the agency of those communities whose health it is. Collaborative action research is a research tradition which is quite explicitly cast around this project (McTaggart 1991).

If the legitimacy of different knowledges cast in terms of the life worlds of different agents were more widely recognized, public health people might feel less obliged to shape their partnerships according to the contraints of singular correct truth. We might also be more reflexive about the operations of power in our own conversations if we were less tied to our assumptions of privileged access to truth.

Rather than leading with our analysis and recommendations (both shaped by truth) we might open our negotiations by presenting our selves, our purposes and our projects. The process of building partnerships for better health might then be reconceived as starting with a small core of shared purpose and creating wider circles of common ground through progressively more effective cycles of collaboration.

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Health transition research, health policy and human welfare

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McNicoll (1995: 334) concluded that future historians would be 'unlikely to compliment the analytical skills and policy acumen of the present generation of social scientists in the population field', who may well be blamed for the long delay in attaining health and economic well-being in large areas of the world, and even for the 'massive squandering of the earth's environmental inheritance that marks our time'.

While this may be unduly pessimistic, there are problems which prevent social science research in health from being more useful. There are conceptual and institutional barriers to more useful research in health; the concept of 'health' is itself vague, and research institutions cause researchers to put the welfare of their own field before the welfare of humanity.

It is difficult to define 'health' and therefore identify the change over time that constitutes the 'health transition'. Reisman (1993) observed:

> Equality in health is important. Sadly, it is also ambiguous: different people have in mind different things even when they employ the same words and phrases. If, therefore, the policy-maker is to take equality in health as an appropriate policy objective, he will clearly have to make it his business to decide what it is, precisely, that he is being sent forth to make more equal (Reisman 1993: 14).

'Health' is a vague concept with many dimensions. Focusing on different dimensions leads to different views on what researchers should do to produce useful knowledge about health by gathering data, measuring change, and drawing policy implications.

Caldwell's perspective on health and the health transition usually focuses on how individuals behave within households or local communities (Caldwell 1990: xiii). This perspective makes the historical course of the health transition a function of changing behaviour at the household level; progress is made when efficacious behaviour, which prevents disease or restores health, gradually replaces behaviour which is less helpful. Such a perspective attributes great importance to the history of literacy and education (especially among women). It also makes ordinary men and women into agents of the health transition, which is one way to increase the probability that research will stay focused on what needs to be done to improve their welfare.

Radical political perspectives on health focus on how people feel about the degree of control they have over their lives in general, not simply how they behave in the home. To feel powerless is to be unhealthy irrespective of other considerations (Wildavsky 1977; Kleinman 1995: 13). Biomedical definitions of health shift the focus to doctors; thus the health transition becomes a function of the kind of medical care people get from the scientifically trained as opposed to folk practitioners.

Macro approaches do not focus on individuals' behaviour or feelings or the treatments offered them. Epidemiology measures morbidity and the control of infectious diseases. From

this perspective the health transition becomes the epidemiological transition, and agency is vested in scientists and health professionals, not ordinary people or even ordinary medicine (Omran 1971; Horton 1995). Alternatively, human agency gets lost in a welter of theoretical confusion (see Krieger 1994). Demographic approaches to health focus, not surprisingly, on mortality and its measurement, as if longer-lived populations automatically become healthier populations (see Stolnitz 1991: 204-205). Economics disputes this by measuring the increasing costs of health care as mortality falls (see Riley 1990). Cultural approaches to explaining epidemiological and economic data stress the fact that interpretation requires more than literal understanding of trends. Instead, it is necessary to put all health-related data in a social and institutional context which explains how it is produced in a bureaucratic society by the individuals seeking help and those offering it. The cultural perspective also stresses the importance of changing values and attitudes among claimants, as well as the increased resources available in the form of sickness benefits (Johansson 1991).

Macro-political approaches to explaining health trends stress the entire political and economic environment nations provide for their citizens. From this macro-level perspective the health transition has been declared an 'embarrassing myth' (Kleinman 1995: 13), because the current global political environment is marred by 100 armed conflicts, 40 million displaced persons, and many more trapped in hopeless rural poverty. 'Health' remains a fundamentally vague concept. In contrast 'death' has only one literal meaning which is why 'mortality transition' means something to all scientists, whereas 'health transition' does not. And each of these radically different approaches to conceptualizing health has radically different implications for policy makers and what they should do to ensure progress in health-related human welfare.

But most social scientists who study health are not encouraged to invest time in basic conceptualization and the problems this raises for research and policy (Krieger 1994). It is important to have good data, and the latest methods are even more important. Nevertheless, as long as empirical research begins with conceptualization (as it must), finding more data or using better methods will never dispel social science controversy about what the health transition is, or when it began, or the extent to which it is or is not continuing (Johansson 1992).

Institutions, incentives and health research

Most formal research is academic in nature and it takes place within a system of separate fields: medicine, demography, sociology, economics, political science, anthropology. Each of these fields adopts a different view of what complex concepts like health or welfare mean in measurable terms. Individual scientists are rewarded for becoming experts in a specialized field and for gathering data using standardized methods in a conventional way, and are subtly discouraged from, and possibly punished for, asking questions about basic concepts. Within any particular field, academics who wish to be well regarded by their colleagues quickly learn that questioning the basics is not the road to success and happiness. Practitioners-in-training are taught that the established perspective is the only legitimate one.

This implies that alternative perspectives on health from other fields are either wrong, intellectually marginal, or illusory. Even in an interdisciplinary setting, rival experts sometimes treat each other with reciprocal disdain, ridiculing the assumptions, methods and data used by alternative perspectives. The end-product of this free market in academically produced, field-specific knowledge is a number of oversimplified answers to very complex policy problems.

In theory, free markets are supposed to produce better products for potential consumers. But given the profound information asymmetry between experts and non-experts, doing more research does not necessarily mean producing more useful knowledge. The consumers of

specialized knowledge do not necessarily know what kind of information they need to solve some real-world problem, and they may not be able to impartially evaluate an oversimplified perspective that looks attractive. Since the debates between experts never seem to get resolved, uncertainty remains high among the less expert. In effect, policy makers are forced to choose between a range of oversimplified answers provided by competing experts. As consumers they tend to reduce their uncertainty by 'buying' the first explanation that seems to provide some all-purpose answer to a complex problem (Johansson 1994).

Academics and health professionals involved in the movement to improve child health are acutely aware that unregulated competition between researchers harms human welfare. Worthman (1995: 10) describes ethno-pediatricians as believing that 'programmatic efforts to improve outcomes for children have been hampered by conceptual polarities and bureaucratic exigencies' so that children's needs with respect to health are 'balkanized' among competing disciplines and agencies.

Making research serve human welfare

How can research be improved to serve human welfare more effectively than it serves the welfare of specific academic fields, and thus the experts who populate those fields? Scientific, institutional and ethical reforms are all equally necessary. Scientific reforms include refusing to treat complex, socially constructed systems as if they were just like much simpler, naturally constructed systems. The scientific foundations for studying complex systems are being laid in this generation, and a discussion of their methodological implications for the social sciences can be found elsewhere (Johansson, forthcoming). But accepting complexity is consistent with the idea that 'health' has no single definition because it is at once biological, medical and political, economic, social and cultural. Which aspect of health is most important for solving a particular problem depends on the context in which a health problem appears. Some are best approached from a biomedical perspective and others from a political, economic or cultural perspective, but no one perspective excludes the others. All expert perspectives are relevant in some way to some specifically identified problem.

The substitution of complexity and its methods does not mean the end of specialization, but it does mean the end of the unregulated competition between specialists. At present, interdisciplinary research generally does not accomplish much, because the experts invited to co-operate have more to gain from competing with one another than from working together. In a new environment genuine co-operation would be supported and rewarded, not covertly discouraged. But even in difficult institutional conditions, field-specific experts have the ethical option to do what they can to produce welfare-enhancing knowledge, even at some cost to themselves.

One of the steps to constructing anything is deciding what should be constructed or torn down. This negotiation of what health policy should accomplish must necessarily proceed in value-laden terms, because it is about what we should or should not want for our own and others' bodies and minds. This implies that improving research means improving the ethical awareness of researchers. Very probably, social scientists need formal ethical training as much as they need training in quantitative methods. In the end, empirical research must fit concepts, data and methods to the requirements of a particular problem, not contort the problem to fit the skills of a particular expert, or the strengths of a particular field.

Such a novel approach to health transition research obviously requires giving up the idea that there is a single definition of health, one type of data that is most relevant, and one set of methods suitable for analysis. It may even require giving up the idea that experts, and only experts, should have control over asking the questions and providing the answers. Although radical health reformers may have become too negative about the value of expert knowledge

and quantitative data, they are surely right to stress the inclusion of ordinary people in the health policy process (see Rohde, Chatterjee and Morley 1993).

Solutions which look good in theory quickly become bad solutions when they are imposed by experts on resentful or suspicious people; research will not lead to health improvement unless the dialogue over what should be done includes the people who are affected, as well as the researchers who generate the knowledge and the decision makers who apply it.

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Can health transition research improve health? Biological models versus community studies.

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The literature on the universal improvement in human survival and health encompasses a wider diversity of views than is the case with attempts to account for fertility reductions. This is curious given the general belief that postponing death is largely a biological issue faced by us all, whereas the decision on the number of children is a process in which human cultural diversity and choice play a larger role. This diversity arises in mortality studies because we are dealing with the deeply entrenched views of the medical profession as well as those stemming from the social sciences. In the latter field, the prevailing thesis is the relatively minor importance of medical factors, at least in the historical period. In addition, it is clear now that the order of importance of the determinants of improved child survival in early twentieth century Europe is different from that in developing countries today. For example, vaccines make a huge contribution to preventing deaths from infectious disease today and were unimportant in the historical period. This is an uncomfortable observation since it suggests that we are far from equal in the face of illness and premature death.

McKeown (1976, 1983) was among the first to seriously question the previously dominant explanation: that medical science and medical services were responsible for the improvement in mortality in Europe at the beginning of the twentieth century. His thesis—that the changing virulence of harmful organisms, increasing human resistance due to improved nutrition and a more sanitary urban environment contributed more to mortality improvements in medicine—has been widely accepted in both medical and social science circles. Szreter (1988) took him to task for not giving enough credit to factors such as municipal ordinances on crowding, living conditions and of course the general improvement in urban water supplies and sewage disposal systems. Woods, Watterson and Woodward (1988, 1989) provided a body of empirical evidence in support of the 'healthy towns' hypothesis, adding to this the effect of nineteenth century declines in fertility. To some extent, these broader efforts to account for child survival improvements were obscured by more biological frameworks such as those produced by Mosley and Chen (1984). In these, the key proximate determinants are nutrition, environmental contamination, injury, maternal factors and personal illness control. With these competing explanations and a huge body of seemingly contradictory empirical and theoretical work on the topic, the definitive history of the reasons for the rise in the expectancy of life at birth still remains to be written.

In 1993, the World Bank chose health as the subject of its *World Development Report*. In this influential volume, the factors responsible for improving health were subsumed into three broad categories: income growth, incorporating improvements in housing, improved nutrition and greater use of health care; medical technology, including better treatment systems as well as new drugs and vaccines; and public health measures such as the urban infrastructure, water, primary health care facilities as well as rising levels of education (World Bank, 1993: 34-36).

These are broad categories but they have the merit of being both comprehensive and capable of empirical evaluation. Indeed, the *World Development Report* contains some rough estimates of the contribution of each of these clusters of variables to mortality decline in Costa Rica, Egypt, Ivory Coast and Japan (p. 39). The surprising conclusion is that their proportional contributions are very different: two-thirds of the improvements from 1960 to 1987 being attributed to rising education in Ivory Coast, whereas in Egypt half of the

improvement is attributed to increase in per capita income. Is every case different or is there something wrong with our measurement tools?

One thing we are learning about health transitions is that mortality and sickness, like fertility, are socially circumscribed conditions subject to various interpretation in different contexts; see Blaxter (1990) on the variety of definitions of health and Sontag (1978) for an even more culturally-based interpretation of health. We have some societies in which stoicism in the face of illness is the norm and illness is a shameful condition, the Bambara of Mali being a good example. In other populations, such as our own, discussion of our maladies is socially more acceptable. Naturally, these different social definitions of illness lead to very different conclusions from morbidity surveys in different populations using the same survey instrument.

We can accept that broad social and economic development may well contribute more to good health than medicine, especially in countries where good medical services are in short supply. It is the next step which is proving most difficult. Are we prepared to go the final yard and argue that the diversity we observe in health and mortality levels is largely the result of household-level factors rather than the social and economic setting which surrounds these households? This must be the conclusion from studies which show the nearly universal positive association between child mortality and the education of parents. Clearly, the economic system has to be strong enough to produce schools and teachers but there remains the question of the acceptability of sending children, especially girls, to school in the first place and of keeping them there.

The evidence on the importance of certain household management arrangements for health and survival is now piling up. Last (1992) has some original ideas based on field work in Hausaland which bring out the importance of extreme experiences of individuals in shaping household strategies for dealing with health and disease. Rose (1992), an epidemiologist, stressed the key role of the tail of the distributions for understanding population-level changes in health and mortality. The work by Das Gupta (1990) on the clustering of deaths in certain families is well known. More recent work illustrating the confounding role of fertility on child survival by Zaba and David (1994) is important in understanding heterogeneity in child mortality at the level of the family. Castle (1992) has generated a mass of individual case studies which collectively demonstrate that the position of the women within the household is the key factor in the identification and treatment of illness. The argument has been broadened to contrast natal and marital obligations with the role of life cycle effects in determining the individual woman's status within the household (Adams and Castle 1994). Bledsoe, Hill and others conclude that in The Gambia, the health and survival of the children are of secondary importance to the demonstration of a wife's loyalty and commitment to her husband by getting pregnant at decent intervals and at times demanded by the husband and his kin (Bledsoe et al. 1994; Bledsoe and Hill 1994). These are only tiny samplings from the burgeoning literature on the role of household level factors in the mortality transition but they are seedlings from which new branches of theory will surely emerge.

The reason why new theory is needed is illustrated by the unsatisfactory nature of attempts to account for mortality decline and health improvements at the national level. The work by Pison and colleagues (1993, 1995) provides a good example of the frustrations of finding satisfactory explanations, even where data are quite rich, in non-experimental situations. Recent work by Hill and MacLeod in The Gambia and by Hill and Chen in Oman, using a variety of quite detailed information on mortality, health and some immediate co-variates, also point to the key information we lack.

We badly need reports from within communities and households about the nature of the changes taking place in attitudes and behaviour (Basu 1995). These will supplement the macro-level information on income growth, medical technology and public health (to use the

World Bank categories) in society at large. At present, we have one group insisting that only the results from randomized, double-blind, placebo-controlled trials are convincing and another whose standards of proof are quite different. Leaving aside the theoretical anthropologists whose goals are not 'explanation' in the usual scientific sense of the word, there are still fundamental disagreements amongst the remainder.

Much will depend on the nature of evidence and what each research school will accept as convincing proof (Hill, forthcoming). The randomized trial community does not have a monopoly on the truth. There is always a gap in the child mortality reductions we can realistically anticipate in true community-based interventions in developing countries when compared with reductions achieved by single-factor interventions in experimental conditions, usually with non-native technical and financial support.

The integration between the two levels of factors affecting health and welfare—the macro-economic, social and epidemiological versus the household level—seems to be the missing link at present. It is unfortunate that the two groups are divided by separate methodologies and to a certain extent, by different theories. But working out how to combine these several traditions must surely be the substance of the future research agenda for work on health transitions worldwide.

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Health transition research and the adoption of innovation

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If health transition (or any other) research is to improve health, it must at least be adopted by those in a position to make use of it. That is to say, it must first be adopted by those who make policy at either a governmental or local institutional level. But while adoption may be a necessary condition, it is not sufficient for health to be improved. That will depend upon implementation and, of course, whether the research was valid in the first place. In this brief contribution we shall deal only with the adoption process and draw from our own work examples of where adoption has occurred and (the more usual experience) where it has not.

Recasting the issue in this way, as a question about the adoption of research findings rather than about the ultimate impact of the research on measurable health outcomes, turns it into a question about the diffusion of innovation: what are the conditions under which new research will be adopted by organizations and/or individuals? For only after an innovation has been adopted does the next step, its measurable impact on a population, become relevant.

Classical diffusion theory dealt primarily with individuals — with farmers adopting hybrid seeds, doctors adopting a new antibiotic, and women adopting new contraceptive methods, for instance — not with organizations such as hospitals or health departments. Policy is made in organizations, however, and it is the adoption of innovations (research findings) in organizations on which we shall focus.

High and low-risk innovations

Innovations may be usefully classified as high and low-risk. Low-risk innovations are those which are compatible with the pre-existing values of an individual or organization, or with professional norms, and which are not highly visible to the public. High-risk innovations are none of these. Greer (1977: 505) has observed

> that professional norms which reward innovation, coupled with a desire of professionals to achieve professional esteem, result in predictable adoption by professionals of low risk innovations. Innovations which depart from professional norms or promise to be disruptive to community or professional relationships are more difficult to predict.

In our early work on alcohol use and abuse among American Indians we observed that very different styles characterized the behaviour of Navajo and Hopi Indians. Navajos engaged in public peer-group drinking to enhance male group solidarity and feelings of personal power. Group pressures to drink were more influential than the unpleasant experience of drinking after the ingestion of disulfiram (Antabuse). Because this form of drinking was proper, Navajo men did not respond well to group confessionals such as Alcoholics Anonymous (AA) which emphasized the impropriety of the behaviour and implied that something is defective about the person who drinks in this manner.

Hopi drinking styles contrasted vividly with those of the Navajos and many other tribes. Outwardly the Hopi appeared sober, and problem drinkers were often found in off-reservation towns. Yet at the time of our work in the mid-1960s, Hopis had the highest mortality rates from alcoholic cirrhosis of all tribes for which we could obtain data. Drinking in the Hopi villages was steady, excessive, and secretive. Alcoholics Anonymous methods had notoriously poor results since public identification of the alcoholic led to ostracism and ultimate expulsion from the village.

We recommended that considerable support be given to research to identify different drinking styles and motivations and to the design of programs congenial to the needs of each tribe. We also suggested that several treatment modes be tested in each program and that an ongoing program evaluation procedure be instituted to determine which methods achieved the most success (Levy and Kunitz 1981: 66-67).

None of these recommendations was adopted. Alcohol abuse was treated as a unitary phenomenon with common causes wherever it was found. This view was inculcated in the training program for Indian alcoholism counsellors and was at the time the dominant professional paradigm. Moreover, evaluation was threatening, especially in a context where program funding was thought to be insecure, and where the providers of care were insecure in their new roles and unsure of themselves. In such conditions, a widely accepted professional paradigm provided much needed security. Clearly, our recommendations would have been a high-risk innovation, and it is not a surprise that they were not adopted.

More recently one of us has published data on the comparative life expectancies of indigenous peoples in the United States, Canada, New Zealand, and Australia (Kunitz 1994). Australian Aboriginal life expectancy is far lower than that of the indigenous peoples in the other countries, and it was suggested that the reason had to do in large part with the relatively weak role of the Commonwealth government in Aboriginal affairs, with the inadequacy of the health services provided to Aborigines, and with the instability of funding of Aboriginal medical programs (Kunitz and Brady, in press).

These observations have been used by Aboriginal health activists and others to support the assumption of greater responsibility for health by the Commonwealth government as well as the transfer of responsibility for health services from the Aboriginal and Torres Strait Islander Commission (ATSIC) to the Commonwealth Department of Human Services and

Health. In fact, shortly after the publication of these data, responsibility for Aboriginal health was transferred from ATSIC to the Department of Health.

The findings on life expectancy have been widely cited and their interpretation widely adopted. This happened because they were congruent with what many Aboriginal health activitists and Commonwealth bureaucrats already believed; they were not threatening or high risk; and they merely gave support to activities already under way. That is to say, in this instance research findings were adopted because they were of a piece with what the professionals in the field already wanted to do. The research was not responsible for the institutional changes that have occurred.

Slack resources

Among the factors most often cited as required for the adoption of innovations in organizations are slack resources, 'resources not required for ongoing operations or pressing problems' (Greer 1977: 520). Clearly, even if an innovation is regarded as desirable by the professionals who control an organization, the absence of slack resources will make its adoption unlikely.

In a study of the health of elderly Navajo Indians, we observed that despite ideological statements concerning the existence of the extended family and its ability to care for elderly members, there were many elderly people who required institutional support, including residence in a nursing home or other extended care facility (Kunitz and Levy 1991). The Indian Health Service, a division of the US Public Health Service which provides health care to Indians, has had a history of providing primary, secondary, and tertiary care, but nursing home services have never been provided. To the extent that they are provided at all, they tend to be under the jurisdiction of states in which reservations are located, or of tribal governments. Nursing home beds are not widely available on Indian reservations, and payment mechanisms make it difficult to gain access to those that do exist.

Indian Health Service hospitals have relatively low occupancy rates, and we urged that some of the unused acute care beds be converted to extended care beds. The suggestion has never been implemented, not because the care of the elderly is not regarded as significant, and not because the IHS does not perceive a problem to exist, but because in the face of increasing budget constraints it is impossible to redirect funds from ongoing operations to new responsibilities, no matter how important they may be.

Political power

Organizations are not homogeneous, and within them there may be numerous centres both advocating and resisting change. In the late 1950s and early 1960s, shortly after responsibility for Indian health was transferred from the Bureau of Indian Affairs (within the Department of the Interior) to the US Public Health Service (within what was then the Department of Health, Education, and Welfare), the leadership of the Indian Health Service developed collaborative arrangements with several schools of public health to do applied research on a variety of ways to improve the health of Indian people. Two projects were located on the Navajo Reservation. One was the Cornell Many-Farms Project, the other was the Berkeley Health Education Project, of which one of us (Levy) was the staff anthropologist.

Both projects were concerned with training Navajos to assume increasing responsibility for delivering appropriate care within the Indian Health Service bureaucracy. After the training period was over, the new professionals were to be given jobs that would allow them to excercise and develop their new skills. The Cornell project trained Health Visitors, women and men qualified to provide both diagnostic and therapeutic services in patients' homes, often after consultation with a physician by two-way radio. The Berkeley project trained

Community Health Education Specialists and Health Education Aides, who understood both Navajo and Anglo-American conceptions of health and illness and were able to translate between them. After the Berkeley project came to an end, its work on problems of medical interpreting was used in a pilot Medical Interpreter Training School which recommended placing one trained medical interpreter in each hospital on the Navajo reservation.

In the event, the Health Visitors were never employed in the capacity for which they had been trained. Instead they were employed as Field Health Nursing Aides and Driver-Interpreters, the equivalents of licensed practical nurses (Adair and Deuschle 1970). The position of Medical Interpreter was never established and the one highly proficient interpreter from the pilot project was hired as a Health Education Aide (Kunitz and Levy, in press; Levy 1988). The health education aides and specialists were hired in these previously recognized civil service positions but were never encouraged to develop creative activities on their own. In each case it was resistance from established professionals, particularly public health nurses, which assured the failure of these innovations. The nurses felt threatened by the expertise and potential autonomy of the new workers and saw to it that they could never work in the semi-independent roles for which they had been trained.

Conclusions

In the settings in which we have worked it is common for researchers to be blamed for doing irrelevant work that is never translated into policies and practices. These few examples suggest that there are numerous impediments to the adoption by providers of the results of health care research relevant to their work, no matter how much researchers themselves may advocate for the utility of their findings. Indeed, we have given examples of only a few of the sources of resistance. High job mobility, genuine lack of interest in doing a better job, unwillingness to read material made available by researchers, a conviction that everything that needs to be known is already known: all play a role as well. Not least, if the researchers are white Americans or Europeans and those providing and benefiting from services are non-white and non-American or non-European, a whole additional dimension of race and anti-colonial resentment comes into play. The importance of these factors cannot be overestimated. Considering all the actual and potential sources of resistance to innovative research findings, the wonder is not that so few are adopted, but that so many are. When it does happen, as our experience suggests, it is not necessarily due to the power of the ideas or the elegance of the work, but because the research legitimates what the policy makers and providers of services wanted to do anyway.

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Does health transition research improve health?

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Whether health transition research can generate improvements in health depends on many factors, not least of which is the nature of the research findings themselves. If the findings can generate specific programmatic recommendations, then it is likely that health transition research can lead to improved health. But the effect of the research on health also depends on the application of the research results. They must be disseminated in ways that people understand, so that they can have the opportunity to change behaviour; or the findings must be integrated into programs of specific activities which are designed to improve health. Thus, from research to health requires at least two things: good research and good application. In the end, the connections may be blurred and indistinct, as the research finds its way into a multitude of programs or activities, so it may not be obvious that a particular research finding was involved in the chain of actions leading to improved health.

Then, too, whether health transition research makes a difference depends on the specific findings regarding the attitudinal, behavioural, or social contexts of improved health behaviour. Though we may seek clarity on these contexts, such clarity may elude even the best researchers. For years we have been trying to understand just why education has such a salubrious effect on life. There are many hypotheses: the content of schooling, the discipline of schooling, the mastery of reading and writing skills, the access to improved jobs and income, changes in self-control or self-esteem, changes in specific health-related behaviour. Researchers have been examining these hypotheses for years, and we are perhaps closer now to understanding the effect of education on health, namely that it is complex, and involves elements of each of the factors named above. But what have we done with these results? To affect health, findings on the attitudinal and behavioural consequences of education need to be reflected in decisions regarding educational reform and financing, and in programs to extend these educational benefits to more people; with a great deal of patience to await the changes in attitudes and behaviour. Also needed is a broad perspective on health and health programs, one which gives legitimate space to claims for health programs to include educational programs, and vice versa.

Thus, to affect health, health transition research needs to be conducted in an atmosphere of collaboration: collaboration between researchers and program decision-makers, between proponents of health, education, or other development programs, between the researchers and the communities seeking a change to health. Such collaborations do not spring into existence easily, but take years of work together to understand each other's perspectives and to develop enough trust to enable collaboration in planning and decision-making.

Over the last five years, a group of us in Mali have been working together to understand the population and health consequences of multi-sector community development projects. The collaboration, between the communities of Kolondieba, Save the Children (US), CERPOD (Sahel Institute), and Columbia University, has not been easy to nurse, given the different interests of each of the partners. The community would like to see the results of the

research faster, Save the Children would like to have more training and involvement of their staff in the research process, CERPOD would like to have cleaner demographic and health data, and Columbia would like to see more cross-linkages and qualitative studies. Despite these different attitudes, however, we are starting to see what is going on in the programs, which in turn helps guide the programs to have a stronger, positive effect on health. In the first couple of years, we identified problems in the health monitoring system that led to incorrect registration of migrations and of marriages, both with consequences for maintaining an accurate count of the population. We also learned that we needed to keep better records of program participation and activities if we were to link the program activities with health consequences. Steps were taken to correct both deficiencies in the monitoring system. Now, over five years into the collaboration, we are much better able to control for specific program interventions.

Data from the census conducted in 1993 five years after initiation of the Save the Children program show that the mothers who know how to read and write their names in Bambara, the local language, have had a lower child mortality rate (under five) than mothers who do not know how to read or write. Women who had no literacy skills had lost 25.8 per cent of their children born in the previous five years, whereas those who had some literacy skills in any language had lost only 18 per cent of their children. Aware that women's behaviour is also influenced by their family or community situation, we also looked at child mortality levels by family and community. Regression analyses of factors affecting the child mortality rate showed that women living in households with other literate individuals also have lower child mortality, even it they themselves do not know how to read. Further, women who live in villages with literacy programs also have lower child mortality levels, whether or not they can read or write. Women in villages with no Save the Children literacy programs had experienced the death of 25.4 per cent of their recent births, compared to 15.6 per cent for women living in villages where the literacy programs were started five years earlier.

When we began to observe these results, we conducted focus groups among women in the literacy programs in one of the pilot villages where these programs had been in operation for a couple of years. We learned that the women in the literacy course took notes of the presentations made by the village health worker. They said that when their children fell sick, they would go to their notes and see what they should do. Instead of watching their sick children helplessly, they felt able to care for them. When we talked with the women who were not in the course, we learned that they relied on the women in the literacy course for help. When their own children fell sick, they would go to ask one of the women in the literacy course for advice on what to do. Thus, the literacy course had facilitated learning of new health care behaviour, both among the women in the course and among their friends and family.

The impact of this research on the health transition had been expedited through program review and modification. Through regular feedback of monitoring and research results to the staff of Save the Children, the results have been used to further extend the effect of literacy courses on health. The literacy program has taken several steps to increase the health consequences identified with the results in the pilot village. First, the literacy program has explicitly incorporated health messages into the presentation of the Bambara alphabet and words. Second, the staff have developed a process to establish women-only literacy training centres, to enable more women to gain literacy skills. Third, they have developed a process to establish village schools, which are community-built and community-taught. At these schools, children learn to read along with health messages, and are encouraged to share these messages with their siblings and family. Fourth, the credit and literacy programs have established an explicit partnership, whereby women participating in the savings and loan program also have health education sessions.

We still do not understand exactly what the women do when they say they are following the notes from the village health worker. When we know more about the specific behaviour, we may be able to foster this behaviour explicitly through other programs, such as the credit program. What is most exciting, however, is that despite all the difficulties we have faced in keeping the research going, we all agree that the research is making a difference, that it is contributing to our understanding of how to mobilize for better health.

Can health transition research in Nigeria improve health ?

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The advent of the Church Missionary Society in Nigeria towards the end of the first half of the nineteenth century marked the beginning of modern scientific medicine (Schram 1971, 1980); and Western scientific medicine came as a further alternative to the several existing indigenous systems of medicine (Orley 1980). The establishment of colonial government, however, meant that most modern health care was provided by the government, the Christian medical missions, and a small proportion by independent private medical practice (Lucas, 1980).

The emergence of the African syncretic churches which possibly now account for nearly one-half of all Christians in southern Nigeria, led to the emergence of faith-healing Christian churches, thus providing three distinct sources of health care providers: modern medicine, traditional health care, and faith-healing, which are often sought concurrently and sequentially depending on the nature of illness.

The distribution of medical care and curative health services during the colonial era, as well as at independence, was uneven with heavy concentrations in the capital and in large urban centres to the detriment of the rural areas where most people live (Orubuloye and Caldwell 1975; Lucas 1980; Orubuloye and Oyeneye 1982). Most government hospitals during the colonial era and shortly after independence provided special facilities for civil servants and their families, while the Christian medical missions provided hospital and community care for the most needy; and their programs were sometimes linked to their more vigorous activities in education (Lucas 1980).

Government hospitals were generally free of charge for the civil servants and their families, while the Christian medical missions operated a flexible pricing policy for their members. Nevertheless, since 1946, health planning has featured prominently in all the National Development Plans in Nigeria. The various pre- and post-independence plans centred around the provision of adequate pure water for everyone; progressive building up of environmental hygiene; and the expansion of hospitals, maternity, and child welfare and dispensary services, coupled with rigorous campaigns of preventive medicine (Nigeria, 1940-56; 1962-68; 1970-74; 1975-80; 1981-85). In keeping with the philosophies adopted by the plans, modern health facilities were expanded and treatment at public health facilities was until 1984 free for those under 18 and all government workers and their families, and highly subsidized for the rest of the population.

The modern health system in rural Nigeria is largely a government one, with a health centre or small hospital in each local Local Government Area headquarters, staffed by at least one trained doctor as well as nurses and a compounder. In the nearest large town there is likely to be a larger government hospital as well as a number of private doctors and clinics (Orubuloye et al. 1991:197). Nearly all the major towns have at least a specialist hospital or a teaching hospital supported by grants from the federal or state governments. The prosperous

oil boom years which began shortly after the end of the Nigerian civil war in 1970 coincided with a rapid expansion in the health facilities, as well as in the educational and other social services. Every bed in government hospitals was filled, and there were long queues at the Outpatient departments. In this period there was a rapid decline in infant and childhood mortality associated primarily with the provision of health facilities and expansion in female education (Orubuloye and Caldwell 1975; Caldwell 1979).

Partly because of the existence of several systems of health care side by side, and the apparent uneven distribution of modern health facilities in Nigeria, much of the earlier social science health research in the 1970s and 1980s concentrated on health attitudes and the treatment systems adopted: modern medicine, traditional healers, home remedies or faith-healing churches; or on the degree of access to health facilities (Caldwell 1994). One of the earlier efforts was the research conducted in 1974 in southwest Nigeria on the effect of public health services on child mortality (Orubuloye 1974), which showed that, when modern health facilities were available, most people used them; and there were significant differences in child mortality by availability and use of health facilities, and education of mothers (Orubuloye and Caldwell 1975). Subsequent studies by Egunjobi (1983) in a northern part of Oyo, Stock (1983) in Hadejia in northern Nigeria, Okafor (1984) in rural Bendel state, and Adedoyin and Watts (1989) in an indigenous area of the city of Ilorin, confirmed the effects of accessibility and ability to pay as major determinants of greater use of modern health facilities and improvement in health conditions.

The determinants of pattern and degree of use of health services have also received some attention (Ademuwagun 1977:899); while the characteristics of patients of spiritual healing homes and traditional doctors, and the factors which influenced their choice of health care providers, were examined in response to their growing importance in the Nigerian health care system (Uyanga 1979). The cultural context of the decisions to use modern or traditional treatment also received a great deal of attention.

Various stages involved in health-seeking have also been examined (Igun 1979). In a study of the response of parents to childhood diseases in a Nigerian Yoruba community, Adetunji (1991) showed that mothers used alternative sources of health care rather than hospitals, clinics and maternity centres. The alternative sources were patent medicine stores where there were personal relationships between the clients and the shopkeepers, free consultation and flexible pricing. The study also showed that parents' location, access to good advisers, the perceived seriousness of the sickness and the religious beliefs of mothers were important determinants of their responses, while avoidance of blame was a major motivating force in parents' search for health care. The study was undertaken in late 1988 and early 1989, when the Structural Adjustment Program had been in place for about three years, and the effect on health treatment was gradually becoming apparent.

Nigerian society has changed from what it was during the oil boom years of the 1970s. The greatest changes have occurred in the area of health care. The charging for health services from 1984 is a major departure from the welfare philosophies of the colonial and post-independence eras. The collapse of high export prices for petroleum, which accounts for 95 per cent of the nation's gross national product, and the introduction of the economic structural adjustment to meet the difficulties created by the end of the oil boom are important changes in recent times. The Nigerian currency unit, the Naira, was worth US$1 before the 1987 float, but has now sunk to about one US cent. The floating of the Naira compounded the economic problem and made health treatment compete with other personal and family costs as the cost of medicine rose sharply with other prices. In the first five years of the Structural Adjustment Program, 1986-1990, government allocation of resources to the health sector dwindled rapidly (Popoola 1993).

Health transition research in Nigeria

By 1991, when the Nigerian Health Transition Research Program began, most government hospitals were almost deserted; the number of people attending them dwindled rapidly, partly because of the expense of treatment caused by the imposition of charges and a move towards selling prescribed medicines at market prices, and partly because most government hospitals have been reduced to mere consulting clinics for lack of equipment and drugs. Many patients were attempting home cures or had turned to the traditional medical system or to the faith-healing churches (Orubuloye et al. 1991).

The Nigerian Health Transition studies undertaken between 1991 and 1994 have shown that the majority of mothers and their children suffered from a wide range of minor and often ill-defined complaints, and health care was sought from several types of health care provider concurrently and sequentially, and the various types of health care providers were seen as complementary rather than conflicting. Although many women sought treatment from modern health care providers at the onset of illness, a significant proportion used home or self treatment. The proportion using home treatment and faith healing was higher than that reported from any previous health-seeking studies in recent years.

Generally, there was the tendency for health-seekers to shift from one type of health-care system to another in the course of an illness, and there was a distinct difference in health seeking behaviour between urban and rural populations. Most respondents in the urban area moved from home or self treatment to hospital treatment as their illnesses progressed, while rural respondents tended to use a combination of hospital treatment, and medicine purchased from patent medicine stores or hawkers of modern medicine. Only a few respondents took their children back for treatment at the government hospital or private clinics after the first round of treatment. Most mothers failed to return because of the additional cost of treatment, so they resorted to home treatment with herbal preparations or medicine bought from chemists or hawkers. This has been a major source of complaint among the health care providers. Even when patients are given specific instructions to report back to the health care providers after a treatment regime, they hardly ever do so because of the additional costs that may be involved.

Perhaps the central findings from the research are the association between making decisions about treatment and paying for it, and the association between paying for treatment and the cost. When decisions were made by the women about their own treatment or that of their children, the women invariably paid for such treatment. However, when the cost was high, the husband paid a substantial part of it. There was a substantial delay in taking treatment decisions, mainly because of the cost, and foster-children were at a disadvantage.

Contrary to expectation and the existing body of knowledge on health-seeking behaviour in developing countries, the education of mothers appeared to exert little influence on their health-seeking behaviour. In nearly all the analyses of treatment behaviour and costs there was no significant difference between women with no formal schooling and those with some schooling. The present difficulties arising from the measures to redress the economic situation have probably had more effect on the educated mothers, who depended mainly on salaries or earnings from trading, and on their husbands' salaries and wages which were frequently in arrears for several months. Trading was at a low ebb, while farmers found it difficult to transport and sell their farm products. In addition, the real value of the earnings had declined, and was at variance with the costs of goods and services. The imposition of charges for government health and other social services, and a move toward selling prescribed medicines at market prices had created an extra burden on the educated mothers who were already accustomed to using modern health care providers. The burdens had become a matter for a great deal of discussion and complaint among women.

The Nigerian health transition studies were carried out at a time when the Structural Adjustment Program was firmly in place and its effect had become apparent in all aspects of life. Since the introduction of the program in 1986, the cost of treatment had risen excessively, and had become more difficult for many families to meet than had been the case for many decades. Certainly, the findings of the research have several implications for health improvement through the adoption of appropriate intervention strategies. We now know that an increasing number of health-seekers are changing to less efficient alternative systems of health care that provide free consultation and flexible pricing systems, while more families than before are carrying the burden of health care. The poor are increasingly finding it difficult to meet the high health costs.

The present state of the health care system and the poor responses to illness may have temporarily halted the improvements which had been achieved in morbidity and mortality before the introduction of SAP. There are now apprehensions of a general rise in the level of morbidity and infant and child mortality (Orubuloye, 1994): a major concern for many families and the health care providers.

Can health transition research improve health ?

Certainly, health transition research can lead to health improvement if intervention programs are broadly aimed at easing the burden created by the current economic difficulties. Possible intervention strategies are:

1. The establishment of a flexible pricing policy which will enable health seekers to pay for treatment in instalments, in cash or in kind. This policy will be consonant with the health care philosophy of the Christian medical missions, faith healing churches and traditional health care providers. The flexible pricing scheme has already been established through personal relationships between health-seekers and the owners of the medical stores in one Nigerian community (Adetunji 1991). Several private hospitals and clinics are already operating a flexible pricing system that enables the poor to use their services.
2. Community participation is an essential aspect of a good health care delivery system. Before the oil boom of the 1970s, several communities built and managed their own hospitals and clinics, as well as their educational institutions. These health institutions which were taken over by governments as the policy of free health services during the oil-boom era could be returned to the communities that originally owned them for their management, as has been done with Christian mission hospitals and clinics. The communities would set up appropriate, less complex, systems of managing the health institutions in their best interest. Community participation will guarantee easy access to health care and minimize the high level of bureaucratization of the government health system.
3. The third policy option is the setting up of a National Health Insurance Scheme. The federal government of Nigeria has recently announced a proposal to set up such a scheme as a complementary source of financing the existing health services. The scheme will make it mandatory for the public to pay a premium that will ensure that health services are readily available and acceptable. A fundamental problem for the government is that of people who do not earn salaries or wages from the private and public sectors of the economy. The majority of the most needy people are not in any wage employment that could facilitate a reliable check off system for financing the scheme. Given the low rate of success of other similar welfare schemes in Nigeria, such as the housing and transport schemes, it would require a high degree of dedication and political will for the program to have any desirable effect on the health care system.
4. The health care of disadvantaged groups such as foster-children could be managed through the enhancement of female education and the provision of employment opportunities

for mothers. These would guarantee women's greater autonomy, and ability to take treatment decisions on their own, and inevitably reduce the number of children available for fostering.

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Can health transition research improve health? Evidence from Sri Lanka[1]

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In my work I have focused on understanding mortality and morbidity change in Sri Lanka through analysing what Caldwell calls the health transition, the social, cultural and behavioural determinants of health (for a more detailed discussion on Sri Lanka's health transition see Pieris 1994, 1995). I believe that this is an effective way of understanding health improvement in Sri Lanka and in general, and must be important for informing policy makers on how to improve health.

Health improvements this century in Sri Lanka have been dramatic. At the beginning of the century mortality levels were little better than those of its South Asian neighbours; now Sri Lanka's mortality levels are among the lowest in the developing world. Life expectancy has doubled since 1901 from around 35 years to over 70 years (ESCAP 1976; UNDP 1995). These impressive figures are despite Sri Lanka still being a comparatively poor country with an annual per capita income of about US$ 560 (UNDP 1995).

There are several important lessons from Sri Lanka in how health transition research can inform health policy. The first is that social, cultural and behavioural factors are vital to the success of health intervention. Sri Lankans made effective use of the new health services, because they were culturally well disposed to using health treatment, having long sought to treat disease; the difference being that in the past they had used indigenous medicine, now they use modern medicine as well as indigenous services. Indigenous notions of treatment emphasized the need for appropriate and timely treatment. Sri Lankans' use of modern health

[1] **This paper is based on the data from the Sri Lankan Demographic Change Project carried out during 1985-1987 as a collaborative project between the Department of Demography, the Australian National University and the Demographic Training and Research Unit, University of Colombo, Sri Lanka.**

services did not mean that they understood and accepted the theoretical basis of Western medicine. They continued to hold indigenous notions of disease and illness causation but the indigenous belief system was able to accommodate and incorporate Western health services, to the point where most treatment involves Western medicine.

Behavioural factors were also important for the effective use of services provided by the new health systems. Women, as well as men, could take the initiative in seeking health services for their children; indeed a young mother would be regarded as derelict in her duty if she did not seek treatment for a sick child. A very important factor here is Sri Lanka's high levels of education which have had a surprisingly limited effect on cultural notions of illness and treatment but a major effect on health behaviour. Education appears to give people, particularly women, greater confidence in seeking health treatment and in using government services.

A second point that is demonstrated by the Sri Lankan case is the critical importance of the provision of effective health services that are easily accessible, affordable and, above all, which the community believes belongs to it. Even though Sri Lankans do not accept many of the notions underlying Western health they have been willing to use government health services because they recognize that the services are efficacious, and have the advantage over indigenous medical treatment of being quick: indigenous treatment was often a lengthy process. Services are provided even to the remotest areas. Services have always been free, or heavily subsidized, though government doctors are nowadays also allowed to provide private services. Finally, Sri Lankans accept the health services as their own, even though service providers are arrogant and uncommunicative particularly to poorer men and women. In field work it was found that even the poorest and least educated regularly used government health services. While government doctors may be perceived as rude, Sri Lankans retain a sense of control because they know that the services are theirs and they complain at once if the services are not adequately provided. Furthermore, they are able to change services, using private practitioners of Western medicine, and government and privately provided indigenous medicine.

An important point is that the provision of government health services has been driven by popular demand expressed through elected representatives. The creation of a comprehensive health system is linked to the introduction of internal self-rule in the early 1930s and independence in 1948. A consequence of this popular demand was that the government-funded services covered indigenous as well as Western medical practitioners. The causes of the popular interest in health were largely cultural and behavioural but they also reflected an early and largely successful instance of social engineering. The Donoughmore Commission, whose findings led to the introduction of self-rule, specifically recommended the implementation of universal franchise, stating that women were more sensitive to social issues including health (Government of Ceylon 1928).

What are the policy implications of health transition as applied to Sri Lanka? Sri Lanka demonstrates what can be achieved in a poor country through the provision of effective, efficient and equitable health services which emphasize the local supply of basic preventive and curative services. Its success has reflected the active interest and involvement of Sri Lankans for a host of reasons not all of which are replicable elsewhere, but should be harnessed when they exist. Where they do not, policy-makers should examine how similar outcomes can be brought about. For example, the Sri Lankan concept that health services belong to them has universal application though the means of bringing it about might differ. It indicates that political representativeness is a good thing though not all governments may be receptive to this message. A sense of ownership might also be brought about by greater community involvement in managing health services; Sri Lanka itself has not gone far in this respect, as health services tend to be run from the centre. A feeling of ownership has more to

do with the processes of democracy and a belief that good health is a universal right and its provision is a government obligation.

Similarly the ability of all family members including both men and women to seek health treatment has been critical in Sri Lanka. This has reflected historical social and behavioural factors deriving from the structure of the family, but has been augmented by high rates of female education. Other countries may lack Sri Lanka's historical basis for the involvement of all in the health seeking process but they should work to promote it, particularly by emphasizing such important factors as female education, and by designing their health systems to encourage the involvement of women.

One cautionary note should be made. There is increasing emphasis on the need to involve the private sector in health. While this has some benefits, perhaps in costs, certainly in offering greater choice and more responsive services, it can come at a price. As noted above, the success of Sri Lanka's health system has been based on the acceptance of the concept that health is a right of all and that governments have a responsibility in ensuring it. While better-off Sri Lankans do use private health services as an important and often preferred option, the poor are mostly restricted to the public system. Support for private health services should not come at the expense of the public system. Furthermore there are dangers in the worldwide trend towards the principle of 'user-pays'. If health services had been charged for in Sri Lanka they might not have been as successful as they were. Sri Lankans, though keen seekers of health treatment, are not wedded to modern health services. They will use those services which they can afford. If they cannot afford government health services they may well turn to alternatives which health specialists may not believe to be as effective.

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Health transition research in India can improve health[1]

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> There has been increasing evidence that the argument between those who explain improvements in health and mortality decline in terms of medical interventions and those who do so in terms of rising living standards is an essentially false dichotomy. The new evidence suggests that, in addition, there are powerful cultural, social and behavioural determinants of health which must be understood if the world is to achieve good health for all by the end of the present decade or even subsequently (Caldwell, 1990: ix).

The term 'health transition' is just a decade old. It was coined at a meeting of demographers, medical scientists and social scientists held in 1985 at Bellagio, Italy (Caldwell and Santow 1989: xiii). Since then considerable literature has been generated on the precise meaning of the term, yet there is no agreement among researchers about what it means.

It appears that the term 'health transition' is derived from earlier terms like demographic transition, fertility transition, mortality transition and epidemiological transition; let us examine briefly the relationship between them. Van de Walle (1990: xiv) suggested that transition of infant mortality from high to low levels could be an important part of health transition. The reasons for his suggestion are that

> infant mortality is in general highly correlated with overall mortality, it is fairly easy to measure, and changes in infant mortality provide an unambiguous indicator that fundamental changes are taking place in the field of health (van de Walle 1990: xiv).

Suggesting that health transition can propel fertility transition, he added

> On the face of it, in historical series, infant mortality declines look very much like marital fertility declines. Although levels are different from one population to another, for the same population pre-decline variations are minor, the decline of infant mortality seems to be generally steep and continuous, and there is a bottom level close to ten deaths per 1,000 births which marks the successful completion of the transition (van der Walle 1990: xiv).

It can be conceded that the transition of infant mortality from high to low levels can be an important part of health transition, that infant mortality is fairly easy to measure and that declines in infant mortality can lead to declines in fertility; but it is arguable whether infant mortality is highly correlated with overall mortality everywhere. That this is not so can be illustrated with the example of the state of Karnataka in India.

Table 1 presents data on infant mortality rates and crude death rates in selected years in the state of Karnataka. The infant mortality rate declined from 95 per 1,000 live births in 1971 to 67 in 1993: a decline of about 29 per cent. But the crude death rate declined from 13.1 per 1,000 population in 1970 to eight in 1993, a decline of about 39 per cent. Thus, the

[1] The time spent in preparing this article was supported by the Rockefeller Foundation. Facilities were provided by the Health Transition Centre, National Centre for Epidemiology and Population Health, Australian National University, Canberra.

crude death rate declined at a much faster rate than the infant mortality rate. Although infant deaths are taken into account in computing the crude death rate, the causes of infant mortality and general mortality are different. Thus, infant mortality need not always be highly correlated with overall mortality, for one can decline at a much faster rate than the other.

Table 1
Infant mortality rate and crude death rate in selected years in the state of Karnataka

Year	Infant mortality rate	Crude death rate
1970	—	13.1
1971	95	—
1975	80	11.1
1980	71	9.6
1981	69	9.1
1982	65	9.2
1983	71	9.3
1984	74	9.6
1985	69	8.8
1986	74	8.7
1987	75	8.7
1988	74	8.8
1989	80	8.8
1990	71	8.1
1991	77	9.0
1992	73	8.5
1993	67	8.0

Source: *Newsletter* of the Registrar General's Office, Government of India.

Discussing the meaning of health transition, Palloni (1990: xvi-xvii) focused on mortality decline only, but he conceded that the term 'health transition' has implications for health also.

Cleland equated the term 'health transition' with epidemiological transition. He raised the question, 'Does the term "health transition" differ from "epidemiology transition"?' and answered as follows: 'I think not. Both are concerned with the distribution of death and disease among population groups; with their determinants and consequences; and with how these factors change over time' (Cleland, 1990: xviii). He continued:

> what is new about the health transition project, as conceived by the Rockefeller Foundation and by the health transition centre at the Australian National University, is not a matter of formal definition but rather its emphasis on social, cultural and behavioural determinants of health (Cleland, 1990: xviii).

But health transition is a much broader concept than epidemiological transition.

Caldwell defined health transition as 'the cultural, social and behavioural determinants of health, that is, nearly all the determinants except the material standards of living, medical interventions and public health interventions' (Caldwell 1994: 13). Explaining that the term 'health transition' is broader than the two terms, 'mortality transition' and 'epidemiological transition', he wrote:

> A broader term than **mortality transition** has been the **epidemiological transition** because it embraces changes in levels of sickness as well as mortality. For our purposes, neither term is sufficient because both are purely outcome measures...We employ the term

> **health transition** to include both epidemiological and related social changes' (Caldwell 1990: xi).

Elsewhere he distinguished health transition

> from the mortality transition which refers only to mortality and not morbidity, and from the epidemiological transition which refers to the change in balance of disease, and especially the cause of death, as mortality declines from higher to lower levels (Caldwell, 1994: 13).

It is not always correct to assume that declines in mortality indicate improvements in the health of a population: low mortality rates and high morbidity rates can coexist in the same population. It has been well documented that, in the state of Kerala in India, low mortality and high morbidity coexist (Kumar 1993). Johansson (1991) stressed the multidimensional nature of morbidity as one of the main reasons for rise in morbidity as mortality falls. It is hoped that everybody agrees that not only low mortality but also low morbidity is necessary for people to enjoy good health.

Expectation of life at birth is regarded as a good indicator of the health of a population, but some thinkers question the wisdom of increasing life expectancy without decreasing morbidity and suffering. Analysing the epidemiological transition in Germany, Imhof (1986:74) observed:

> Certainly it is correct to say that the traditional causes of death claimed their victims from all age groups and that life at that time was therefore a much riskier business than it is today. But isn't it also correct to say that death was often more humane then, since most of the infectious and parasitic diseases kill quickly? Today, precisely because we have defeated those diseases, we are living longer, growing older. Simultaneously, however, the dying process in many cases has been lengthened. Chronic suffering no longer just extends over a period of a few days or weeks but can often last for many months and years so that death is ultimately viewed as liberation.

Neither mortality transition nor epidemiological transition nor increase in life expectancy can be an alternative for health transition.

Health transition should take into account not only mortality and morbidity, but also disability. Health expectancy is generally divided into different states depending upon different degrees of disability (Mathers, Robine and Wilkins 1994). This means that disability is regarded as a negative health state.

Health transition may be defined as a process through which high levels of mortality, morbidity and disability are reduced to low levels by influencing cultural, social and behavioural factors. Because we are talking about a 'process', we need data at two or more points of time in order to measure health transition. We have to identify cultural, social and behavioural determinants of health such as educational levels among males and females, the age and sex composition of the population, and habits like alcohol consumption and smoking. The list of determinants mentioned here is suggestive rather than exhaustive. These determinants will be our independent variables. By the dependent variable, health, is meant age- and sex-specific mortality, morbidity and disability rates.

Health transition in a country or in a state within a country may be measured first by the selection of cultural, social and behavioural determinants or indicators of health. A number of considerations may even determine the selection of indicators, not the least of which is availability of data. It may be difficult to express some of the indicators in quantitative terms:

quantitative values may have to be assigned to such indicators. Then health indicators, that is, age- and sex-specific mortality, morbidity and disability rates, are selected.

The association between the independent and dependent variables can be measured by one of the multivariate regression techniques. The difference in the values of association between the two sets of variables at two or more points of time indicates health transition. No claim is made that the method of measuring health transition suggested here is final or perfect:these are some ideas to consider. But it certainly should be possible to measure health transition.

The health of the aged

As a result of fertility and mortality control programs implemented in India since 1951, there have been considerable declines in both fertility and mortality. For example, the crude birth rate has declined from about 40 per 1,000 population in 1941-51 to about 30 in 1990 (Government of India 1991: 113). Similarly, the crude death rate has declined from a little over 27 per 1,000 population per year to a little lower than 10 during the same period (Government of India 1991: 113). The expectation of life at birth has increased from about 32 years in 1941-51 to about 59 years in 1986-91 (Government of India 1991: 113). It has been projected that the crude birth rate will be lower than 28 and the crude death rate lower than nine in 1996-2000 (Registrar General 1988: 17). The expectation of life at birth is projected to increase to about 65 years by 2001 (Government of India 1991: 113).

One of the consequences of these improvements is an increase in both the proportions and numbers of the aged, that is, those who are 60 years and above, in the total population of India. The proportion of the aged increased only marginally from 5.5 per cent in 1951 to about 6.5 per cent in 1991 and is projected to increase to about 7.4 per cent in 2001. But the number of old people increased from about 20 million in 1951 to about 55 million in 1991 and is projected to be about 76 million in 2001.

In India, the old have traditionally been honoured and respected. Religious texts and writings enjoined the sons to provide all support for their old parents. Grown-up children, especially sons, provided not only financial and material support for their parents; they also provided psychological and emotional support. As Caldwell (1982: 54) wrote, 'It is a fallacy to think of the value of grown-up children being merely equivalent to an insurance policy against old age and sickness'.

Since Independence in 1947, India has been through a rapid socio-economic transformation which has brought in its wake important changes in the social profile of the people. Forces of modernization, technological changes and social mobility have changed the lifestyle and values of people. These changes have adversely affected traditional respect as well as attitudes of empathy and care for the aged. As a result of the acceptance of contraception and fertility control by an increasing proportion of couples, some older people are likely to be adversely affected in the matter of care by their children because of increasing mobility and other reasons. More important, there is now a greater investment by the family in the education and upbringing of children. The high cost of living, coupled with changing priorities, affects the intrafamily distribution of income in favour of children. In the phraseology of Caldwell (1982: 333-351), the **wealth flow** in India is turning downwards. All these socio-economic changes have adversely affected the situation of the aged in India, who, like those in other countries, suffer from a range of problems. However, 'of all the problems associated with an aging population, health care demands top priority' (Ory and Bond 1989: 1). This is also true of the aging population in India.

The study

A paper entitled 'The health status of the elderly in India' (Reddy 1995) was presented at the 'John C. Caldwell Seminar' held on 14 - 17 August 1995 at the Australian National University, Canberra. The data analysed in the paper were collected in the 42nd Round of the National Sample Survey (NSS) conducted by the National Sample Survey Organisation (NSSO) in India during July 1986-June 1987. The National Sample Survey collected data not only on the health problems of the elderly, but also on their various other problems. The survey covered 49,693 households in each of which there was at least one person aged 60 years or over. Of the 49,693 households covered, 32,237 were in rural and 17,456 were in urban areas. The survey covered the whole of India except for Ladakh and Kargil districts of the state of Jammu and Kashmir, and rural areas of the state of Nagaland.

Findings

The findings related to the health status of the elderly are briefly summarized here. The details are available elsewhere (NSSO 1991: S176-S220; Reddy 1995).

In both rural and urban areas about five per cent of the male aged were physically immobile, compared with about seven per cent of the female aged. The difference is perhaps due to the cultural neglect of women. The proportions physically immobile increased with age in both males and females and in both rural and urban areas.

About 45 per cent of old men and women in both rural and urban areas were suffering from some chronic disease; the proportions with chronic disease increased with age in both men and women and in both rural and urban areas. Two major chronic diseases suffered by the elderly were cough and pains in the joints. In both rural and urban areas, a greater proportion of men than of women suffered from cough, a difference explained by the difference in behavioural patterns: for instance more men than women smoke. More women than men suffered from pains in the joints in both rural and urban areas.

The disease prevalence rate, expressed as the number of the aged suffering from each disease per 1,000 during the two weeks before the survey, was 427 among men and 357 among women in rural areas; in urban areas, the rate was 423 among men and 366 among women. Thus, the disease prevalence rate was higher among men than among women in both rural and urban areas; clearly, this reflects the differences in their behavioural patterns.

The proportion hospitalized, expressed as the number of the elderly admitted to a hospital per 1,000 on any day during the two weeks before the survey, was 101 among men and 93 among women in rural areas; in urban areas, the proportion was 99 among men and 93 among women. Thus, the proportions hospitalized were slightly lower among women.

Government measures

Until recently, the Government of India justified its reluctance to provide special health services for the aged by saying

> It is necessary to dispel the belief that old age is synonymous with ill health or disability. Thanks to modern science and technology, most people are able to lead an active and healthy life up to the age of 70 years or more (Ministry of Social Welfare 1987: 20).

Many state governments provide old age pensions ranging from Rs.50 to Rs.75 per month to each of the destitute aged (one Australian dollar equals about 22 rupees); they maintain a few homes for the destitute aged and provide grants to a few more old age homes maintained by voluntary organizations. But no state government provides special health services for the elderly.

The Government of India has recently started a scheme of assistance to voluntary organizations which have programs for the aged. The programs included under the scheme are foster care-adoption services, mobile medicare services, day-care services, old-age homes, and non-institutional services. The conditions stipulated for voluntary organizations to qualify for grants from the Government of India are stringent. There appear to be very few such organizations receiving grants, except for old-age homes.

Under the program of mobile medicare services, voluntary organizations should provide services for the health care of elderly persons. Since it is difficult for the families to take the aged persons to distant hospitals, the need for assistance for geriatric disabilities is more acute among the poverty stricken elderly population. Under this program, grants will be provided to voluntary organizations which possess 'experience and expertise' in providing mobile medicare services for the aged in rural and urban slum areas. The financial outlays on various items approved by the Ministry of Social Welfare are meagre. Information on the number of mobile medicare units operating in the country is hard to obtain, but it is safe to conclude that their number is far short of requirements.

Intervention strategies

The foregoing analysis has implications for many policies and programs which will improve the health of the elderly. Some of the important intervention strategies are as follows.

1.There is a need to create geriatric facilities and provide geriatric services in all the government hospitals.

2.There is a need for liberalization of the conditions stipulated by the Government of India to provide grants to voluntary organizations which operate mobile medicare units for the elderly.

3.More finance needs to be approved by the Government of India for the setting up and maintenance of mobile medicare units for the elderly by the voluntary organizations.

4.There should be an end to the cultural practice of discrimination against women in access to food, nutrition and health facilities.

5.People in general and men in particular need to be educated about the health hazards of consuming alcohol, smoking, tobacco chewing, inhaling snuff and using drugs.

6.Carers for the aged in the family are invariably females (daughters-in-law). It is known that mass education in general and female education in particular is an important factor in the decline of mortality and morbidity (Caldwell, Reddy and Caldwell 1983; Caldwell 1989). It is, therefore, necessary to promote education among the people, particularly among females.

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Synthesis: where are we now?

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The Health Transition Program has flagellated itself, perhaps unnecessarily, in an effort to show that those involved in health transition research have also been directly, and even simultaneously, involved in interventions to produce better health. The research reports either reproduced by the program's publications or induced by them clearly suggest actions which, if taken at the governmental or the personal level, could lower the risk of mortality (Caldwell and Santow 1989; Caldwell et al. 1990. *Health Transition Review* 1991-1995). The

introductory paper in the first number of *Health Transition Review* worried about the problem (Caldwell and Caldwell 1991). Yet hardly any of those papers or the contributions to this forum report on the implementation of health transition findings and the subsequent demonstration that health improved as a result. This summary concentrates first on the reasons for this and second on whether this shows, in health terms, that health transition research is hardly worthwhile.

The program's goals, and indeed the global health effort, were not helped by the unusable and almost Utopian definition of health which was contained in the World Health Organization's *Alma-Ata Declaration* 15 years ago: 'health.... is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity...' (Warren 1990:22). Because of the form taken by the most reliable data, most papers in the program have employed reductions in mortality as an index of improving health. This can be defended as a rough index of health improvement over the long haul and as a measurement showing success in delaying what most people fear most. Yet Johannson[2] is undoubtedly right in arguing that the field has been held back by lack of agreement on what health really means.

Perhaps a greater problem, although one inadequately discussed in the literature, is the priority allocated by individuals to good health. Any meeting or declaration will place it foremost. Yet in reality many individuals would rather smoke on their own or drink with their companions than lower their mortality risks. Similarly, governments limit their expenditure on health so that they can meet other targets, including taxation reduction, according to their perceptions of electoral reactions.

Forum contributors argue both that health transition research has tended to focus most strongly on restricted areas of the health field, such as household and family mechanics and also the situation of women, and that this has probably been a good thing in that the most gains may be made in this area (Hill, Johansson, Pieris, Findley). The prospect of considerable gains is probably real, although interventions in these intimate and sensitive areas may provoke the most resistance. It is also pertinent to note Hill's warning that the study of historical experience may be a misleading pointer to the contemporary Third World. Findley makes an important and strong case for health transition research when she points out that the nature of the family and the interaction of its members are entirely omitted from nearly all epidemiological research.

Returning to the focus of this forum three basic points should be made. The first is that health transition research has a justification outside the improvement of health and that is its ability to explain what has happened to the world's population in terms of its health. The second point is that many of us believe health transition research can have an enormous effect on health even if no specific interventions follow from it. The third point is that specific interventions are likely to follow even if the health transition researchers are not personally involved in their construction.

Elaborating on the second point, health transition research is likely to achieve its greatest effect through the public awareness of its findings, mainly through the media and mainly by human beings achieving greater knowledge of themselves, and institutions achieving greater knowledge of people.

At the individual level, there are many parallels. The most direct are changes in Western lifestyles through research information about the effect of exercise, losing weight and other factors. The women's movement gained equal education for boys and girls more by debating the previous inequalities than by championing legislation. Even fundamentalist Muslim societies must be beginning to ponder the demonstration that the failure to educate their daughters imperils the survival of their grandsons.

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2 All authors' names not followed by reference dates refer to the preceding papers in this forum.

Because of the reliance of much health transition research on data collected by surveys, most of the findings tend to be social rather than behavioural or cultural. Accordingly, much of the appeal is to government and other institutions rather than to individuals. It is also to international organizations and helps to shape their agendas which ultimately affect all of us.

Research of a health transition type certainly had some influence on the 1978 Alma-Ata Declaration. Health transition research, much of it carried out by persons who have contributed to *Health Transition Review* and its allied publications, clearly had a major effect on the *1993 World Development Report* (World Bank 1993) and the 1994 Cairo International Conference on Population and Development (ICPD) *Plan of Action*. In many of these plans and publications, health transition findings help to cement alliances that gain greater strength through their union. Thus, in the ICPD, forces favouring education, the improvement of women's position, and better health, formed a common front in promoting both greater education for girls and greater autonomy for women. Similar coalitions backed the motions urging greater stress on improved reproductive health.

One further point emphasized in the forum (Pieris, Johansson) is that the impact of health transition research through the 'know-thyself' mechanism clearly implies that health programs are likely to be most effective when there is a substantial degree of community control.

Elaborating the third point, it is likely that the health transition academic literature itself is known to many public health researchers and health policy makers and helps to frame their interventions. These people publish in public health journals and not in *HTR*. Increasingly, they can locate the health transition literature through computer searches. Nevertheless, there remains an obligation on health transition researchers to make this cross-fertilization of knowledge as easy as possible. A good contemporary example of a health crisis compelling medical and social science researchers to read each others' papers is provided by the AIDS epidemic with its major cultural, social and behavioural components.

The forum authors wrestle with the problem of collaboration. The starting point (especially in Legge and Johansson) was essentially that of the blind men trying to describe an elephant from the aspect of each one's own first contact. They emphasize that each profession has its own 'singular truth' and that both individual experience and reasons of professional expediency and advancement exert strong pressures to retain their singular perspectives. Yet the real truth, and the path to accelerated health improvement, is multi-faceted.

Collaboration is not merely a case of yielding time to learning another field and reading its literature. Professionals are rewarded most for specializing increasingly in their own fields. Furthermore, collaboration can often be achieved only by agreeing on the lowest common multiple of the information derived from the different fields of the various collaborators.

Not only scientific disciplines but implementing organizations have strong reasons for resisting potentially useful health innovations which are not central to the way the institution currently functions or is staffed, or is organized (Kunitz and Levy).

The examples chosen from the forum contributors' own experiences are instructive. Findley and colleagues relate the story of a grassroots Malian collaborative project that actually worked, with the social scientists demonstrating the positive interrelation between education and health programs and so inducing the collaborative program to place greater emphasis on education. Furthermore, they came up with a finding that may appeal to commonsense but which is far from received wisdom in the health transition field, namely that specific locally-oriented health information embedded in the educational programs actually assisted the recipients in getting health services and achieving better health. Pieris analyses the Sri Lankan health miracle, and, again with commonsense not always supported by majority opinion, concludes that the Sri Lankan health approach was so successful 'for a host of reasons, not all of which are replicable everywhere in the world, but which should he

harnessed when suitable conditions exist'. This puts the case for analysis and dissemination rather than collaboration. Kunitz shows that the Australian government readily accepted the case for its greater intervention in the area of Aboriginal health precisely because it did not find this recommendation threatening. Orubuloye described research in an area where health transition analysis may be increasingly important in rolling back new policies and in enforcing collaboration as rethinking takes place. The Nigerian research shows what happens as structural adjustment programs enforce the user-pays principle on health services in poor countries. The economists failed to envisage not only that there would be many fewer users but that mothers would lose control of health decision-making over their children and that fostered children would be hit especially hard. One is reminded that the otherwise excellent *1993 World Development Report* (World Bank 1993) was disconcertingly entitled *Investing in Health*, with apparent scant regard to human suffering.

It is, however, the examples of frustration and lack of collaboration which show most clearly why the major effect of health transition research is likely to come from its information being supplied and spreading into public awareness, so changing individual and societal outlooks and thence behaviour and institutions. One reacts thus to Kunitz and Levy explaining the rejection of research into American Indian drinking patterns by a medical establishment certain of its role in treating the effects of drinking on an individual level and deeply suspicious about how to undertake social investigation and where it would lead. It might be noted here that both the Australian government and the Australian Aboriginals were keen to accept further Commonwealth financial and physical medical intervention because this approach avoided the issue of the extent to which high aboriginal mortality derives from cultural, social and behavioural patterns, and substituted high-cost, relatively ineffective medical approaches for attempts to bring about potentially more effective behavioural change. Kunitz and Levy also show how a plan to introduce female household health visitors on the American Indian reservations was foiled by the nursing service which foresaw competition. In Botswana an effective household visiting system has been largely destroyed by increasingly using the health visitors as nurses' assistants at the health centres, a role which the medical profession understands and which appeals to the health visitors because it makes them appear to be part of the medical establishment. Reddy shows that the Indian Government used an argument right out of the health transition armoury, namely that age should not be identified with ill-health, to justify refusing funds to help the aged. In this case the government approach may well be undermined by the dissemination of research findings on the disabilities of the old and the burden they impose on their families.

It is incontestable that health transition researchers should devote more time to attempts at achieving collaborative projects with the health profession. Nevertheless, the effect of most research is likely to be achieved in two different ways. The first way is through specific reports to government or other authorities which analyse the health transition evidence and which demonstrate how effective interventions can be made within the scope and aims of existing institutions. Hill provides an example of this in terms of the potential for focusing health services—especially, perhaps, the services of health visitors—on the small minority of families where most child morbidity and mortality occurs. Clearly, measures would have to be devised which identified such families by means other than waiting until after the first child death.

The second way, and certainly the main justification for health transition research, is the changes made in human behaviour and social institutions by the wide acceptance of its findings. In comparison with the huge amounts spent on medical research and intervention, the funding of health transition research is likely to prove a particularly cost-effective way of improving health. This may be specifically true with regard to support for *Health Transition Review*.

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Children of the Urban Poor: The Sociocultural Environment of Growth, Development, and Malnutrition in Guatemala City. By Francis E. Johnston and Setha M. Low. Boulder: Westview Press, 1995. Paperback 189pp $US40.

What are the effects of the environment on child growth, cognitive development and ultimately academic achievement in a poor community? These are the key questions raised in this book, which describes a comprehensive longitudinal study of young children living in a poor community in Guatemala City in the early 1980s. As explained in the appendix, although it would perhaps have been better placed as an early chapter, the study was initiated by the belief that

> in lesser developed countries, and especially their urban centers, success in life is defined increasingly on the basis of educational achievement; consequently, the effects of components of the environment on academic achievements represent an important area of study.

The scope of the study was broad, the research methods included both quantitative and qualitative approaches, and the book widens the picture still further by setting the project within the social context of Guatemala with a couple of introductory chapters on the historical and political situation. In fact, the overview expressed throughout the book emphasizes the importance of a 'contextual' approach to the interpretation of any determinants of child development, and the need to be aware how complex is the ecosystem within which children develop. Considering the nature of this book, which is essentially a description of one study, the context is well described.

The book progresses from the wider context to focus on a poor community in Guatemala City, in a new area set up to house people displaced by the devastating 1976 earthquake. Most of the parents of the study children were of rural origin and the families are undergoing a process of 'ladinoization, that is, their transformation from rural peasant to urban worker'. The idea of families coping with the double stress of rapid cultural change as well as poverty is another continuing theme of the book, and is supported by a vivid picture of the community in the ethnographic chapters, which are studded with personal experiences of members of the community.

The quantitative part of the study includes recording the growth of children, anthropometric measurements being used as quantitative indicators of the children's nutritional status and general health. In fact, other indicators of health are not included in the book, although passing comments such as '40% of mothers ...have experienced the death of one or more of ...[their] children' suggest that a section on mortality and morbidity would have been illuminating; perhaps the notion of pursuing academic achievement as the major point of interest would be better considered in the light of other health issues. More detail about nutritional status at an early age would also be enlightening, since growth is considered here as an outcome measure in its own right, as well as a determinant of intellectual development and achievement. The youngest cohort studied is from three years to eight years old, an appropriate time to be looking at academic achievement, but late for studying the

determinants of nutritional status. It is likely that very early feeding practices and infectious disease play a major role in the poor level of attained growth observed in the preschool and school children in the study, but despite one baseline measurement of a group of 12-month-old infants, little attention is paid to the deterioration of nutritional status in the first two years of life. If the growth status of school aged children is considered a determinant of academic performance, then these causes of poor growth are surely relevant and worthy of discussion, even if quantitative data are not available. In effect, the idea of contextual analysis is not fully explored in determining the cause of poor growth.

Socio-economic status in general is found to be important in determining height and weight of children within this community. However, the conclusion that mothers' education has minimal bearing on height for age is based only on findings from seven-year-old children in the study. The contrast drawn with the strong effect of mothers' education in reducing the mortality of children is not really valid, as the age groups are obviously different; we are not given the effect of mothers' education on height for age of children under three years, the age group of most concern for mortality risk. The interaction of age and sex differentials displayed in the data cries out for explanation; and the statement that the more recent cohorts achieved better nutritional status at each age, leads the reader to ask questions about topics not followed up in the book. Why is there a sex differential? Why was there a progression over time? The authors themselves pointed out that the ecosystem of child growth and development is complex, but insufficient attention is given to the microsystems within that ecosystem.

Cognitive development is measured by IQ, and the concerns about using this instrument are dealt with adequately in the text. The results indicate a clear association between IQ and socio-economic status, which increases with age, and a strong relationship between IQ and home stimulation which is especially important in younger children. As a means of intervention, promotion of stimulating interaction between mother and child is seen as a method to improve IQ, and as an alternative to improving socio-economic status, which is put in the too-hard basket. However, one can only wonder if the long-term modification of such maternal behaviour may not be equally difficult to achieve.

The ultimate outcome studied was school performance. A pathway of causation is proposed, with socio-economic status, home stimulation and nutritional status all contributing to IQ, which in turn influences academic achievement, as assessed by specific school grades and basic skills tests.

Although the quantitative analyses are somewhat limited in terms of possible potential, they clearly point to poorer socio-economic status as a primary cause of poorer nutritional status and academic performance among these children from a disadvantaged settlement in Guatemala City. The book combines the dual quantitative and qualitative approaches well; key socio-economic factors that influence child development are drawn out from the qualitative findings, and are discussed as possible points of intervention. Poverty is seen as the basic issue, but the authors, perhaps realistically, avoid the issue of changing an iniquitous society which has grown up within a historical context; instead they propose intervention strategies that protect against the harmful effects of poverty. Buffers include means to avoid large debt, strong social networks and an interactive and stimulating relationship between mother and child.

Overall the case presented in this book is convincing and comprehensive, and despite a perhaps rather hurried final presentation, it holds together well. It is good to see that the outcome of this study is available for all and that the experience is not confined to the bottom of a filing cabinet.

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Being Pregnant in Rural South India: Nutrition of Women and Well-Being of Children. **By Inge Hutter. Amsterdam: Thesis Publishers 1994.Paperback 39.50 guilders or US$26.50.**

This book provides a model for micro or anthropological demographic studies. The author spent almost two years in 14 villages of northern Karnataka, South India, carrying out meticulous fieldwork. She learnt the language and became deeply interested in the culture. She had a clear objective, researching some of the medical attitudes which were to be encapsulated in the 1993 resolution of the World Health Assembly calling for the 'elimination of harmful traditional practices and other social and behavioural obstacles affecting the health of women, children and adolescents... such as child marriages, dietary limitations during pregnancy and female genital mutilation'.

The Nutrition of Women and Well-Being of Children should be a subject of almost cosmic importance, but so much knowledge, expertise and effort could have been employed in a somewhat broader study of society.

Hutter describes how women and children get less food than men, partly because they eat last and the supply tends to run out. Eating, especially among better-off women, declines through pregnancy, especially steeply in the final months. There is some belief in tabooed foods but this has little effect on eating patterns. Hutter found little evidence to support anthropological findings that Indian women eat less during pregnancy in order to have a smaller baby and hence an easier birth or conversely to leave more space in the body for a larger baby. The women told her they found it increasingly hard to eat during pregnancy, and she reports this as one of her main findings. One has a faint suspicion that this was caused not merely by nausea and lack of appetite but also by lingering folk memories that the culture was not very enthusiastic about pregnant women eating heartily through a wide range of foods. P. H. Reddy has reported a similar situation in Karnataka.

Hutter reached two other important conclusions which contradict many of the beliefs in these matters. She found that a woman's total weight gain during pregnancy turned out to be the best predictor of the baby's birth weight; and that there are important limits to the statement that, irrespective of the mother's food intake, the foetus will take all it needs. In fact, in the important and critical situation of badly nourished women eating relatively little during the last trimester, it is the mother's bodily needs which win the battle over the needs of the baby.

Certainly, the pregnant women are somewhat cautious about certain 'heating' foods during pregnancy and even more cautious of sexual activities because of their heating effect. Fortunately, it is the better-off and better-fed women whose food intake declines most rapidly during pregnancy. Indian women have little room for error as Indian babies at birth are the world's lightest, averaging only 2700 grams, or 8 per cent above the WHO criterion for critically low weight usually associated in the West with prematurity. She confirmed previous research that light Third World babies usually gain weight faster in the first month than heavier Western babies.

Finally, a few details should be recorded about the research methodology. Two hundred pregnant women were followed with food intakes being measured by a 24-hour recall. Babies were weighed at birth and again one month later. Interestingly, Hutter reports that it was her participant research and her one-on-one interviewing which obtained good information in contrast to the rather inhibited responses she obtained when using focus groups. See Forum, *Health Transition Review* 4 (1), April 1994, for a discussion of these issues.

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Victorian Families in Fact and Fiction**. By Penny Kane. London: Macmillan 1995. xiii + 172 pp. Hardback.**

This interesting book would doubtless be reviewed at greater length in a fertility journal than in a health one. There are, however, health implications. The author points out that British families were earlier kept to a moderate size not only by late female marriage but also by child mortality. Slow decline in the latter was a necessary precursor of fertility control. Subsequently, the controlled small families were to experience ever less erosion by mortality. Nevertheless, as Penny Kane points out, the nineteeth century family, although subject to high parental mortality, was no more disrupted by it — at least in a quantitative sense — than is the late twentieth century family by divorce.

The book has two striking strengths. The first is its exhaustive use of Victorian and other nineteenth-century literature, autobiographies and biographies to make up for the lack of survey findings in delving into attitudes towards children and reproductive behaviour. The second is the concept of 'family fluidity' in a period before the sanctification of the nuclear family. Orphaned, and a surprising number of non-orphaned, children were fostered; maiden aunts did not go off and live in their own flats; widows, widowers and other relicts of high mortality were suddenly attached to the families. The Victorian family had many similarities to families in the contemporary Third World. Changes were brought about by declining mortality, but the real genitor of the modern nuclear family was the mobility induced by the Industrial Revolution, and the modern family began to crystallize out in the vast dormitory suburbs growing up around the new cities.

Let us turn briefly to the much more copious material on fertility. The book is convincing in its assertion that, by the early nineteenth century, really large families were regarded as comic and were often accepted by their parents with gloomy fatalism. They were usually avoided by periodic abstinence. Such high fertility would not last forever. The Industrial Revolution brought enormous material change and an explosion of radical social thought. Literacy and education led to an appetite for new ideas and new ways, and schooling meant that children were increasingly expensive.

What probably needs explanation is why this educated, urbanized industrial society retained unchanged moderately high fertility for so long. Kane believes that part of the problem emerged from the increasingly affluent Victorian society itself, namely the cult of female purity. Spouses did have trouble discussing sexuality and fertility control, and husbands who suggested the use of condoms were suspected of becoming familiar with them in brothels. But, when the change did come, it was rapid, and fertility fell more steeply through the whole interconnected English speaking world than was the experience of continental Europe.

And who were the chief chroniclers of the Victorian attitudes to children and large families? The most often cited sources are a familiar bunch: Jane Austen, Charlotte Bront', Samuel Butler, Charles Dickens, Benjamin Disraeli, George Eliot, George Gissing, Henry James, and above all, Mrs Gaskell and Anthony Trollope. In addition, there were the autobiographies of William Lovett and Moberly Bell. The literature bears witness to tremendous change and increasing secularization and scepticism in thought. Most of us do not realize that the outrageously funny children's poetry written by Hilaire Belloc at the turn of the century was changed but little from the serious moral admonitions to children half-a-century earlier. As we treated children with more levity and allowed them more freedom, we had, for our own sakes, to have fewer of them.

A Field of One's Own: Gender and Land Rights in South Asia. **By Bina Agarwal. Cambridge University Press, 1994. xxii + 572 pp. Hardcover 395 rupees**.

Health Care Expenditure by Government in India: 1974-75 to 1990-91. **By K. N. Reddy and V. Selvaraju. New Delhi: Seven Hills Publications, 1994. x + 199 pp. Hardcover 275 rupees.**

Bina Agarwal's book is a definitive one, the product of great erudition. It will long remain a source book for information on customary and legal land rights and on gender discrimination. This review, in accordance with the policy of this journal, will, however, address only those aspects of the book which have health implications.

The author argues for greater land rights for women as part of a broader case for their access to economic resources and for a reduction in systematic bias against females. In a country that is still overwhelmingly agricultural the emphasis on land rights is appropriate. The lack of women's access to land ownership through inheritance is not merely a matter of governments and laws, because there are laws dictating equal inheritance for children, but they are not observed. One reason they are not observed is that substantial dowries are paid out at daughters' marriages. The problem is that dowry is rarely in the form of land and most of the dowry passes effectively from her control to that of the family into which she has married.

Yet there is a strong social welfare case for women owning resources in their own right and earning income. One reason is that women spend their money better than men. Research in very different parts of India has shown that a wife's earnings are spent almost entirely on household food and on other such expenditures as clothing and health care for her children and herself. Men fritter away much more of their income, typically between one-quarter and one-third, chiefly on alcohol and tobacco. The result is that increases in wives' incomes show up much more strongly in family nutritional and health gains than do equal increases in husbands' incomes.

Another reason why women's possession of income or land has a health impact on their children is the extra confidence and right to make decisions that flows from the possession of such economic resources. It empowers them. This is important because mothers usually notice children's illness first and are the earliest to want treatment. In fact, in the case of daughters' sicknesses, they may be the only ones who feel that the expense of treatment is justified. They are ceded more right to use their own incomes for these purposes than their husbands' incomes. The benefit of owning some land, or having usufructuary rights in public land is even more obvious in the case of widowed, divorced or seperated women. This is not a trivial problem, for one-fifth of Indian and Bangladeshi households are female-headed.

The thrust of Agarwal's argument is irrefutable, but she, like the rest of us, falters when offering solutions. Female children are discriminated against because their parents will be faced in a few short years with paying an impoverishing dowry and thereafter will lose their daughter to another family and receive no support or help from her. This reaches its most extreme in northern India, embracing the full length of the Gangetic Plain, except West Bengal, as well as the states to the southeast of the Indus, Rajasthan and Gujarat.

Admittedly, even in these areas of extreme patriarchy and village exogamy, sons usually do not have to wait until their fathers' deaths to inherit land, but may receive it when the household is partitioned after they have married and perhaps fathered one or two children. But they still live near their parents and their land is also either beside that of their parents or in the same area. Labour is often pooled and tools lent, and physical or material help can be

given immediately. If a newly married woman were given an equal share of the land, she could hardly take it to her new abode. Where there is a fully developed land market, she could sell it and buy an equal quantity of land in her new village. But in rural India this would mean the erosion of a family's land every time a young woman married, and this would make the birth of a girl no more welcome an event than in the present dowry system. The author rather lamely suggests that the solution might lie in greater flexibility of post-marital residence. On the other hand, if a girl survives childhood and possesses land or income after her marriage, there is little doubt that both she and her children will benefit in health and other terms.

In spite of all its problems, India does comparatively well in health terms. It now enjoys a life expectancy at birth of 60 years although its annual per capita income is only US $310. It records the highest life expectancy of the world's 20 poorest countries, and it is one of only four countries with incomes below $500 which has reached 60 years. The distribution of expenditure which has allowed this, and the planning involved, is set out in great detail by K. N. Reddy and V. Selvaraju's *Health Expenditure by Government in India*: India's health difficulties are less an unwise use of resources than sheer poverty.

Women's Health Issues in Nigeria. **Edited by Mere Nakateregga Kisekka. Zaria, Nigeria: Tamaza, 1992. xix + 234pp. Paperback 60 Naira .**

Good, thoughtful and informed collections of studies of Nigerian health are rare and fortunately this is one of those rare exceptions. It is a credit to Mere Kisekka, the Women's Health Research Network in Nigeria and to the various funding agencies that support them.

This review will necessarily focus on the chapters which are more social or behavioural than medical in their content.

This reviewer increasingly inclined, as he read the book, to the conclusion that traditional medicine and popular belief contained much that was dangerous and there was a great deal to be said for the spread of modern medicine in Nigeria and probably all over Africa.

Christine Adebojo presents a clearer picture of the distribution of clitoridectomy than any previous study of Nigeria, and I was astonished to learn that one-third of female circumcisions in Ima and Bendel states are of the pharaonic type. Given the patchwork of ethnic groups in Nigeria, one wonders whether a research and statistical approach based on states was the best one. Another chapter, that by Dora Shehu about Sokoto, adds to the reasons given for the practice. In international literature it is often explained by men wishing to control their wives' desire for sex, especially extramarital activities. In southwest Nigeria the usual explanation given by women is that it is done to prevent the clitoris touching the baby's head during birth and so killing the child. In Sokoto, perhaps because girls are married at puberty and perhaps because of a difficult relationship between the sexes in a purdah society, Shehu found that men favour incision for faster and easier penile penetration.

Several authors report on the geographically widespread traditional practice of the 'salt cut' of the vaginal wall in an attempt to overcome a range of reproductive disorders. Traditional maternity practices offer other threats. Many healthy foods are tabooed during pregnancy, mothers after birth are bathed in scalding hot water and they may be induced to swallow dangerous quantities of potash. Mairo Alti-Mu'Azu reports of Northern Nigeria that traditional birth attendants (TBAs) make women squat for birth, with the result that large numbers of women refuse to go to hospital for birth because they fear the dorsal position. When TBAs were confronted by obstructing labour they traditionally resorted to either prayer or the salt cut, but, where a modern hospital exists in the neighbourhood, they increasingly attempt to get the unfortunate woman to it.

Bridget Onah reports on childlessness in Anambra State, although her analysis would probably be equally appropriate to much of West Africa. Childless women are usually blamed

for their condition on the grounds of abortion, STDs or association with witchcraft. Not only is the woman castigated but so is her husband, and there is constant conflict with his mother who usually wants to see him remarry and cast out the offending woman. Most of these wives sensibly tried secretly to become pregnant by other men. The situation is said to be improving.

In contrast, Francisca Omorodion concludes from Benin City Welfare Office case files that wife battering is on the increase. Younger wives are in greater danger, and two-thirds of the files refer to women under 25 years of age. The files also contain a disproportionate number of reports of wife battering among the poor, but this may merely prove that the better-off find it easier to keep state intrusion at bay.

Mere Kisekka's chapter on women's organized health struggles and the challenge to establish women's associations with an effective impact in the health area certainly shows the way to go. Unfortunately, nearly all her successful examples are drawn from outside Nigeria, indeed from outside Africa, but this book may hasten Nigerian change.

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Acknowledgements

The Editors are deeply appreciative of the assistance of the people listed below who reviewed articles submitted to *Health Transition Review* between October 1994 and September 1995.

Lawrence Adeokun
Benjamin E. Amenuvegbe
William G. Axinn
Stan Becker
Deborah E. Bender
Caroline Bledsoe
William Brass
Indrani Pieris Caldwell
Michel Cara'l
Sarah E. Castle
Tom Dow
Tim Dyson
Rennie D'Souza
W. J. Firth
Indra Gajanayake
Noreen Goldman
Gillian Hall
Allan Hill
Valerie Hull
Susan Hunter
S. Krishnamoorthy
Stephen Kunitz
Cynthia Lloyd
Margo Lyon
Charles McGilchrist
David Martin
Srinivasa A. Meegama
D. Y. Ofosu
Christine Oppong
I. O. Orubuloye
Alberto Palloni
Anne Pebley
Anthony Pramualratana
P. H. Reddy
Lado Ruzicka
Philip Setel
Supamas Sethapongkul
F. C. Shorter
Peter Svedberg
Habtemariam Tesfaghiorghis
Jeroen van Ginneken
Mark van Landingham
Stephen J. Woodhouse
Huda Zurayk