Health Transition Review

EDITORS	John C. Caldwell	Health Transition Centre, ANU, Canberra
	Shail Jain	Health Transition Centre, ANU, Canberra
ASSOCIATE EDITORS	Allan G. Hill	Harvard University, Boston
	Arthur C. Kleinman	Harvard University, Cambridge
	Stephen J. Kunitz	University of Rochester, Rochester
	Samuel H. Preston	University of Pennsylvania, Philadelphia
	Jon E. Rohde	UNICEF, New Delhi
	Gigi Santow	Demography Unit, Stockholm University
EDITORIAL ADVISORY BOARD	Lawrence Adeokun	Makerere University, Kampala
	Moses Kweku Aikins	Medical Research Council, The Gambia
	Alaka Basu	Cornell University, Ithaca
	Caroline Bledsoe	Northwestern University, Evanston
	John H. Bryant	Aga Khan University, Karachi
	Pierre Cantrelle	ORSTOM, Paris
	Lincoln C. Chen	Harvard University, Boston
	John Cleland	London School of Hygiene and Tropical Medicine, London
	Monica Das Gupta	Harvard Center for Population and Development, Cambridge,
	Herman L. Delgado	Mass.
	Bob Douglas	Institute of Nutrition of Central America & Panama, Guatemala
	Aleyya El Bindari Hammad	NCEPH, ANU, Canberra
	Sally Findley	WHO, Geneva
	Julio Frenk	Columbia University, New York
	Godfrey Gunatilleke	Instituto Nacional de Salud Pública, Mexico
	Carl Kendall	Marga Institute, Colombo
	Peter Kunstadter	Tulane University, New Orleans
	Rance P.L. Lee	University of California, San Francisco
	Shirley Lindenbaum	Chinese University of Hong Kong
	David Mechanic	The City University of New York
	Richard Meckel	Rutgers University, New Brunswick
	Marvelous Mhloyi	Brown University, Providence
	Joyce Lewinger Moock	University of Zimbabwe, Harare
	W. Henry Mosley	The Rockefeller Foundation, New York
	Cynthia Myntti	The Johns Hopkins University, Baltimore
	Mark Nichter	The Ford Foundation, Jakarta
	David Nyamwaya	The University of Arizona, Tucson
	Patrick O. Ohadike	African Medical and Research Foundation, Nairobi
	I.O. Orubuloye	United Nations Regional Institute for Population Studies, Accra
	Alberto Palloni	Ondo State University, Nigeria
	Olikoye Ransome-Kuti	University of Wisconsin, Madison
	P.H. Reddy	Federal Ministry of Health, Lagos
	Zeba Sathar	Population Centre, Bangalore
	Santhat Sermsri	Population Council, Islamabad
	Richard Smith	Mahidol University, Salaya, Nakornpathom
	Andrew Tomkins	All Souls College, Oxford University, Oxford
	Budi Utomo	Institute of Child Health, University of London, London
	Susan Reynolds Whyte	University of Indonesia, Jakarta
	Huda Zurayk	University of Copenhagen, Copenhagen
		The Population Council, Cairo
PRODUCTION	Jeff Marck	Health Transition Centre, ANU, Canberra
	Wendy Cosford	Health Transition Centre, ANU, Canberra
	Sandi Goddard	Health Transition Centre, ANU, Canberra

ISSN **1036–4005**
Published by the Health Transition Centre, National Centre for Epidemiology and Population Health,
The Australian National University, Canberra ACT 0200, Australia.
Email addresses: htr@coombs.anu.edu.au
Annual subscription: *Health Transition Review*, Health Transition Centre, Fax 61-6-249-7926 or htr@coombs.anu.edu.au
Publication frequency: April and October.
Printing by Better Printing Service, Queanbeyan, NSW
Cover design by Graphic Design Unit, The Australian National University

Health Transition Review 7, 1997, 1-12

The effect of spouses on the mortality of older people in rural Bangladesh

M. Omar Rahman

Department of Population and International Health, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115

Abstract

This paper uses prospective data to show that older widowed and divorced individuals in rural Bangladesh have significantly higher mortality than their currently married peers. In contrast to Western societies however, women suffer more from widowhood (in terms of decreased survival) than men. This disparity can plausibly be attributed to the greater poverty associated with widowhood for women than for men. However the effect of adverse selection into widowhood on the basis of poor health for both men and women cannot be ruled out nor can the effects of adverse changes in lifestyle.

Although those aged 45 and above represent a relatively small fraction of the population of South Asia, they constitute a sizeable number and are expected to increase significantly in the next three decades[1] (United Nations 1986). South Asian society however, like many of its Asian neighbours, has paid little attention to this segment of society. Because of the lack of formal social support networks, insurance and pension schemes, in this part of the world, older men and women are largely dependent on spouses for support and those without spouses are considered to be very vulnerable, particularly older women (Cain 1985, 1986). As South Asia plans for its future, it will need a lot more information than is currently available on the importance of spousal support for the welfare of older men and women, and the consequences of lack of such support. This paper uses data from rural Bangladesh to examine the effect of the absence of spouses on the survival of older people, focusing especially on differences in effects between men and women.

A number of studies in Western societies have shown that older widowed and divorced people have significantly higher mortality than their married counterparts with the excess risk being proportionately greater for men than for women (Gove 1973; Helsing and Szklo 1981; Helsing, Szklo and Comstock 1981; Helsing, Comstock and Szklo 1982; Hu and Goldman 1990). Relatively little is known however about mortality differentials by marital status in non-Western societies such as those in South Asia. Unlike the West, where men appear to suffer more than women in terms of mortality risks as a result of marital dissolution, women in South Asia arguably bear the brunt of the negative effects of widowhood and divorce on survival. In these patriarchal, patrilineal and patrilocal societies, social and economic status for a women is tied to marriage perhaps more than in other societies, and loss of a husband through widowhood or divorce may well be catastrophic (Cain 1985, 1986). Thus, one might

---

[1] Conventionally the cut-off for the aged is around age 60. However given that life expectancy in South Asia is around 55, I have decided to investigate a broader age range starting at age 45.

expect the relative risk of mortality associated with widowhood and divorce to be larger for females than males in such societies.

Hypotheses

In this paper I focus on the mortality experience of older widowed and divorced individuals in rural Bangladesh in order to investigate the following hypotheses:

> (1) There are significant differences by sex in the relative mortality risk associated with widowhood and divorce. Specifically widowed and divorced women are likely to have higher mortality compared to their married peers than their male counterparts.
>
> (2) The higher relative mortality of widowed and divorced women can be largely accounted for by greater differentials in economic status between married and non-married women *vis-à-vis* their male counterparts.

Methods

Study population - background

The data for this study come from the Matlab demographic surveillance system (DSS) organized under the aegis of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). A detailed description of the surveillance area can be found in Shah and Koenig (1988).

The Matlab surveillance system has maintained a continuous register of all vital events, births, deaths, marriages and migrations, in a population of approximately 190,000 people in 142 villages since the mid-1960s. In addition, censuses were held in 1974 and 1982 to assess a number of different socio-demographic variables including household assets, living arrangements, occupational status and educational level. Currently, a linked data file for the period 1974-1982 is available for analysis. The major advantages of this data set are its prospective, reliable recording of dates of key demographic events, the large sample size and the ability to follow longitudinally all marital status transitions.

Study sample selection

All men and women aged 45 and above who were living in the surveillance area at the time of the census of 1974 (13,508 men and 11,381 women) were included in the analysis. These individuals were then followed for eight years up to 1982 during which period all deaths and all changes in marital status were recorded; person-years were allocated to the relevant marital status category in one-year intervals. All persons were followed until either the end of the study, their date of death or their date of emigration from the study area.

Statistical method

This study uses discrete time hazard logistic regression models with one-year time intervals to analyse event histories of individuals (Menken et al. 1981; Allison 1982, 1984).

Essentially what the discrete time hazard model is doing in the context of this data set is as follows: every discrete unit of time (in this case the unit is one year) for every individual is treated as an independent observation. An individual is followed from 30 April 1974 up to the point where he or she either withdraws from the study, or dies, or the study ends. He or she thus contributes an integer number (0-8) of person-years of exposure.

During any one-year interval of observation, if a person is lost to follow-up, no person-time is allocated for that interval. If the person dies within the interval, the full interval of person-time is allocated. Thus in this scheme, censoring takes place at the beginning of the interval and deaths at the end of the interval. If an interval is truncated by the end of the study, no person-time and consequently no deaths occurring during that time are counted. In terms of the data set any death occurring between 30 April 1982 and 30 June 1982 is not counted. Explanatory variables, most importantly marital status, are allowed to change only at the end of each one-year interval.

The final step in the estimation procedure is to pool all the observations for each individual and calculate maximum likelihood estimates of the logistic regression model:

$$\log(P/(1-P)) = \text{constant} + B_1{*}X_1 + B_2{*}X_2 + B_3{*}X_3 \; + \ldots . B_k{*}X_k$$

In the above model, the exponent of each coefficient [$\exp(B_k)$] is interpreted as the relative risk of dying with and without that characteristic X_k.

Results

Table 1 shows mortality rates and mortality ratios (non-married / married) by marital status and age group for men and women aged 45 and above in the Matlab surveillance area for the period 1974-82. Non-married mortality rates are observed to be higher than married mortality rates for both sexes. However, in contrast to developed countries, the excess mortality risk associated with non-marriage is higher for women than for men at most ages, as shown by the mortality ratios in Table 1.

Similarly an analysis of differences in life expectancy by marital status yields for the most part greater declines associated with widowhood for females than for males[2] (Table 2).

In the study population, the vast majority of men (92.5%) are currently married compared to only 42.1 per cent of the females. More than half of the women (56.4%) are widowed compared to only 5.9 per cent of the men. The proportions divorced and never married are very small (approximately 1% divorced and 0.25% never married) and roughly similar for each sex (Table 3). Widowers are on average older than widows reflecting the large age difference, about eight years, between husband and wife in rural Bangladesh.

Of those men who became widowed at ages 45-49 during the eight-year study period, 40.7 per cent remarried while under observation. On the other hand only 6.1 per cent of men who became widowed at ages 60 and above during the study period remarried while under observation. Overall during the eight year study period only 7.7 per cent of the men in the sample who became widowed remarried while under observation. Because not all men who became widowed during the eight-year study period were followed up for the same time, for example someone who became widowed in the last year of the study would have only one year of follow-up, no definite conclusions can be drawn about the likelihood of remarriage after widowhood for men at different ages. However if we assume that older men were no more likely to become widowed late in the study period than younger men, the above results suggest that remarriage is relatively common for men who become widowed at ages 45-49 and declines fairly sharply for those who become widowed at older ages. In the case of

---

[2] The life expectancies in Table 2 are conditional on remaining in a particular marital state. Thus the large difference between widowed and married life expectancies at each age for women is somewhat deceptive as it does not incorporate the probability of married women becoming widowed.

women, in our study population negligible numbers of women aged 45 and above who became widowed during the study period ended up remarrying while under observation

Table 1
Mortality rates (deaths per 1000 person-years) and ratios during study period by sex, age and marital status

Mortality rates							
Marital status	**Age in years**						
	45-54	55-64	65-74	75-84	85+	45+	60+
Males							
Married	16.38	27.71	54.18	92.82	173.04	35.62	55.56
Widowed	24.78	44.36	79.28	133.18	211.76	90.57	107.07
Divorced	39.47	69.93	54.05	127.66	250.00	62.76	90.91
All males	16.70	28.67	56.17	100.01	186.21	38.93	60.70
Females							
Married	7.25	19.01	39.42	51.09	111.11	15.36	33.93
Widowed	12.89	28.54	63.80	128.16	186.21	48.72	70.03
Divorced	23.04	33.51	88.44	52.63	500.00	42.93	66.48
All females	9.33	24.65	59.20	123.21	181.99	34.65	61.83

Mortality ratios (Divorced or widowed/married)							
Marital status	**Age in years**						
	45-54	55-64	65-74	75-84	85+	45+	60+
Males							
Widowed	(ns) 1.51	1.60	1.46	1.43	1.28	2.54	1.93
95% C.I.	(0.89-2.57)	(1.23-2.08)	(1.22-1.76)	(1.21-1.70)	(1.01-1.63)	(2.31-2.80)	(1.74-2.13)
Divorced	2.41	2.52	(ns) 1.00	(ns) 1.38	(ns) 1.44	1.76	1.64
95% C.I.	(1.25-4.66)	(1.62-3.93)	(0.50-2.00)	(0.61-3.07)	(0.36-5.82)	(1.31-2.36)	(2.13-2.37)
Females							
Widowed	1.78	1.50	1.62	2.851	(ns) 1.68	3.17	2.06
95% C.I.	(1.38-2.29)	(1.28-1.75)	(1.34-1.96)	(1.47-4.26)	(0.75-3.78)	(2.88-3.50)	(1.81-2.35)
Divorced	3.18	1.76	2.24	(ns) 1.03	(ns) 4.5	2.80	1.96
95% C.I.	(1.30-7.78)	(1.00-3.08)	(1.27-3.98)	(0.23-4.53)	(0.54-37.38)	(1.97-3.96)	(1.29-2.97)

Note: ns=not significant at the 5% level

Table 2
Life expectancy, by age, sex and marital status

Exact age (years)	e_x widowed (years)	e_x married (years)	e_x married-widowed (years)
Females			
45	23.61	27.89	4.3
50	19.44	23.93	4.5
55	15.78	19.73	3.9
60	12.27	16.01	3.7
65	9.48	12.91	3.4
70	7.10	9.70	2.6
75	5.18	9.09	3.9
80	4.32	6.73	2.4
85	3.10	3.50	0.4
Males			
45	18.33	23.73	5.4
50	16.45	20.50	4.0
55	13.30	17.13	3.8
60	11.02	14.10	3.1
65	8.75	11.31	2.6
70	6.34	8.90	2.6
75	5.18	6.91	1.7
80	3.90	5.23	1.3
85	2.86	2.76	-0.1

Note e_x = life expectancy at exact age x

Table 3
Proportion of total person-years during study period in each marital state for men and women aged 45+

	Males		**Females**	
Marital state	Person-years	col.%	Person-years	col.%
Married	83,139	92.50	32,560	42.05
Divorced	719	0.80	790	1.02
Widowed	5,321	5.92	43,679	56.41
Never married	180	0.20	194	0.25
Unknown [a]	521	0.58	209	0.27
Total	89,880	100.00	77,432	100.00

[a] No information on the marital history of these individuals was available and their exposure was eliminated from all multivariate analyses

Table 4
Proportion disabled by sex and marital status

	Males			**Females**		
Marital state	Disabled Person-years	Total Person-years	Row %	Disabled Person-years	Total Person-years	Row %
Married	624	83,139	0.70	403	32,560	1.24
Divorced	36	719	5.02	35	790	4.42
Widowed	584	5,321	10.98	3,005	43,679	6.88
Never married	40	180	22.22	13	194	6.74
Total [a]	1,284	89,359	1.44	3,456	77,223	4.47

[a] These figures do not include the category of unknown marital status =521 person-years or 0.58%

Table 5
Proportion of men and women with selected household assets

Assets (1974)	**Married** %	**Divorced** %	**Widowed** %
Males			
> 1 room	28.48	26.69	28.96
> 1 boat	68.86	66.92	60.00
ò 1 cow	59.28	43.91	50.01
Owns quilt	41.12	39.07	48.31
Owns watch	16.13	9.48	16.75
Owns lamp	70.27	64.22	68.99
Females			
> 1 room	42.63	17.25	22.69
> 1 boat	73.79	32.68	48.15
ò 1 cow	66.67	24.64	41.42
Owns quilt	55.46	26.85	37.83
Owns watch	22.74	07.52	14.49
Owns lamp	76.82	33.20	56.4

Note: The asset data refer to men and women who retained their original marital state as of 1974

Although a larger proportion of all women are classified as disabled (4.5%) compared to all males (1.4%), a larger proportion of widowers are disabled (11%) than widows (6.9%). This is probably to a large extent a function of the higher mean age of widowers than widows (Table 4).[3]

Table 5 presents comparisons of selected household assets for men and women who did not experience any marital transitions during the study period. This avoids the problem of changes in asset structure which may accompany widowhood or divorce, especially for females. As mentioned earlier, information on economic status is only available on a

---

[3] For the purposes of this study, disabled is an occupational category which refers to gross physical handicaps, such as blindness, paralysis, loss of a limb, which make it impossible for the respondent to work.

household level and is measured at the beginning of the study. Household assets are a crude measure of access to resources for individuals within the household. Clearly this is a better measure for household heads who have more control over allocation of resources than do other family members. As older men are generally household heads, while older women are not, household assets in general are more reflective of the individual economic status of men than of women. Thus men and women who live in households with similar levels of household assets may have widely divergent levels of control over resources. Chen, Huq and D'Souza (1981) using data from the same study population have conclusively demonstrated that older women within the household are allocated a significantly smaller share of nutritional resources than older men.

The data show that compared to men, non-married women live in households with significantly lower levels of assets relative to their married counterparts. Keeping in mind the discussion above, this would imply that widowed and divorced women have substantially less access to resources relative to their married counterparts than do men. Insofar as less access to resources is correlated with deterioration in health status, this pattern is consistent with the higher widowed to married mortality ratios observed for women in our study.

Multivariate analysis

Multivariate analysis (Table 6) helps to clarify some of the questions arising from the bivariate tabulations. Table 6 presents results from a discrete time hazard model analysis of sex differences in mortality differentials by marital status for older men and women. When no control variables are introduced (Model 1, Table 6), relative to the currently married, the excess risk of mortality associated with widowhood is substantially smaller for males than for females (i.e. the widow*male interaction coefficient in Model 1, Table 6 is negative and statistically significant at the 5% level). This suggests that males suffer less mortality disadvantage relative to their married peers while being widowed than do females. On the other hand the increase in the relative odds of mortality associated with divorce appears to be statistically no different for men and women (i.e. the divorce*male interaction coefficient in Model 1, Table 6 is not statistically significant at the 5% level). Introduction of controls for age (Model 2, Table 6) sharply reduces the non-married excess risk, more for the widowed than for the divorced, reflecting the higher mean age of widowed persons compared to divorced and married persons[4].

Introduction of disability status (a measure of gross visible handicaps — Model 3, Table 6) as a control reduces the relative risks for widowed and divorced individuals, suggesting that disability accounts for some proportion of the excess mortality associated with widowhood and divorce, more for widowhood than divorce. Differences in disability account for more of the mortality differential between the widowed or divorced and the married in the case of males than females. This is shown in the increase in the ‘widow*male’ and ‘divorce*male’ coefficients in Table 6, reflecting a further widening of the disparity between the male and female mortality ratios.

Table 6
Regression coefficients (standard errors) from discrete hazard models of mortality for males and females aged 45 years and above

Model	**1**	**2**	**3**	**4**	**5**

---

[4] As the mean age of widowers is higher than that of widows and age is positively correlated with mortality risks, introduction of age as a control further widens the disparity between the relative risks (widowed versus married) of males and females.

Variable	**B (S.E.)**	**B (S.E.)**	**B (S.E.)**	**B (S.E.)**	**B (S.E.)**	**Reference**
Intercept	-4.1369*	-10.6629*	-11.0092*	=11.5136*	-11.5530*	
Male	.8321*	.4182*	.4560*	.4459*	.3790*	
	(0.0479)	(0.0493)	(0.0493)	(0.0493)	(0.0495)	Female
Widowed	1.1652*	.5326*	.4790*	.4749*	.2949*	
	(0.0495)	(0.0516)	(0.0513)	(0.0519)	(0.0528)	Married
Divorced	1.0326*	.7092*	.6875*	.6854*	.4079*	
	(0.1808)	(0.1827)	(0.1830)	(0.1831)	(0.1840)	Married
Never married	.6766*	.3238	.1655	.1783	.1312	
	(0.2433)	(0.2502)	(0.2542)	(0.2536)	(0.2500)	Married
Widow - male	-.1669*	-.2032*	-.2526*	-.2433*	-.1016	
	(0.0713)	(0.0728)	(0.0733)	(0.0734)	(0.0739)	
Divorce - male	-.4313	-.0916	-.1338	-.1138	-.0728	
	(0.2382)	(0.2416)	(0.2424)	(0.2425)	(0.2429)	
Age in years		.1444*	.1581*	.1691*	.1819*	
		(0.0119)	(0.0121)	(0.0121)	(0.0121)	
Age squared		-.0005*	-.0007*	-.0007*	-.0008*	
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	
Disabled			.8019*	.7441*	.7714*	
			(0.0470)	(0.0473)	(0.0474)	Able
(1974-75) year of famine				.3606*	.3473*	
				(0.0365)	(0.0366)	(1977-82)
(1975-76) famine year +1				.3531*	.3483*	
				(0.0371)	(0.0372)	(1977-82)
Owns one or more boats					-.0734*	
					(0.0308)	No boat
Owns quilt					-.2310*	
					(0.0317)	No quilt
> 1 room in household					-.0566	
					(0.0313)	One room
≥ one cow in household					-.2428*	
					(0.0303)	No cows
Owns watch					-.1554*	
					(0.0419)	No watch
Owns lamp					-.1627*	
					(0.0313)	No lamp
-Z log Likelihood:	51912.3	48810.5	48549.3	48398.2	47991.2	
parameters	6	8	9	11	17	

Note: * $p < 0.05$

Thus, controlling for age and disability (Model 3, Table 6), non-married mortality risks are higher than married mortality risks and male mortality risks are higher than female mortality risks at each age and for each marital category: male married mortality is higher than female married mortality and male non-married mortality is higher than female non-married mortality. However there is a greater proportionate increase associated with widowhood for females than for males, that is, female widowed/married mortality ratios are higher than those for males. Although divorced/married mortality ratios are suggestive of female disadvantage they are not statistically significant at the 5 per cent level.

Once controls for baseline economic status are introduced[5] the picture changes substantially (Model 5, Table 6). Sex differences in the mortality risks associated with widowhood or divorce are substantially attenuated and no longer statistically significant. The widowed or divorced are still at higher risk than the married, with male mortality risks being higher for each marital category. However widowed versus married mortality ratios for females are now no longer significantly greater than those for males, implying that economic status accounts for a greater proportion of the differential mortality between the non-married and the married for females than for males.

Despite the fact that divorced individuals of either sex appear to have higher relative risks than the widowed in both sexes (Table 6), joint statistical tests (not shown) indicate that owing to the imprecision of the estimates of relative risks for divorced individuals, it is impossible to reject the hypothesis that there are no differences between the mortality risks of the widowed and the divorced. Controlling for age results in the excess risk of the never-married becoming statistically insignificant. The relatively small number of deaths in the never-married group in the 45+ age category (8 deaths/180 person-years) causes the statistical tests to be low in power, so that only large differences in mortality risks can be detected.

The fact that there are no statistically significant differences in mortality risks between widowed and divorced men in rural Bangladesh is not altogether surprising. Divorce in this population is invariably initiated by men and there is little social stigma attached to the male. There is also little evidence that divorced and widowed men are in substantially different economic situations. Finally although remarriage is somewhat more common for divorced men than their widowed counterparts, this is probably a reflection of the lower age of divorced men than widowed men. Nonetheless, it is still possible that the study's inability to demonstrate mortality differences between widowed and divorced males is due to the small number of divorce-related events in this age group: 45 deaths to divorced men in 717 person-years of exposure to divorce.

In contrast to the situation for males, the lack of observed differentials in mortality risks between divorced and widowed females is more surprising from a conceptual point of view. Divorce in Bangladesh carries a substantial social stigma for women. These women are seen as failures in the eyes of village society, including their immediate kin. Financial settlements are either non-existent or meagre (Cain 1984). They are thus financially and socially worse off than widows and one would expect them to have higher mortality risks. The fact that such differences were not observed may be due to the small number of divorce-related events in this age group: 34 deaths in 792 person-years of exposure to divorce.

Discussion

This study has compared and contrasted the mortality experience of older males in rural Bangladesh with that of their female counterparts in the same population. Comparison with previously existing results from developed countries yields both similarities and differences.

---

[5] There was a major famine in the first year of the study and mortality risks were higher for both males and females in all marital categories in the year of the famine and the year following it (Model 4, Table 11). Mortality ratios for males and females (i.e. widowed/married and divorced/married) did not significantly change with the addition of controls for exposure to famine years. Three-way interactions between sex, famine years and the mortality experience of widowed and divorced individuals were tested for but were not found to be significant. This suggests that the excess mortality risk of widowed and divorced individuals (especially females) *vis-à-vis* their married counterparts did not increase significantly during the famine years.

The results of this analysis show that the non-married have higher mortality risks than their currently married counterparts and males have higher mortality risks than females in all marital states at all ages. A large part of these differentials between the married and non-married can be accounted for by differences in age, disability status and economic status. The relative importance of these modifiers however varies by sex. Economic status seems to account for more of the variation in mortality between the married and the widowed for females than males. This pattern is consistent with the hypothesis that in rural Bangladesh, widowhood is associated with greater poverty for women than men. In this social setting, access to resources for women, unlike men, is largely determined by marital status. This is mainly due to the fact that social constraints bar women from earning their own living. Married women enjoy greater access to resources than their widowed counterparts through the earnings of their husbands. Upon becoming widowed, women in this society are forced to depend upon the earnings of first-degree male relatives, primarily sons. Widowed men on the other hand have no such social constraints against earning their own living and to the extent that they are physically able to work are less dependent on their sons for financial support.

While the above explanation about the increase in poverty associated with becoming widowed is certainly a plausible explanation for the excess risk of mortality associated with widowhood for women relative to men, one cannot completely exclude the effects of selection. Given that we have a heterogeneous group of widowed women, some already widowed before they were first observed, and some who became widowed during the eight-year period of observation; and we have data on household assets at only one point in time, the beginning of the study, and no information on household assets right before the transition to widowhood, it is conceivable that the increased poverty associated with women who are widowed in our study population may be due to a higher likelihood of poor married women becoming widowed than their richer counterparts. This would imply that the state of widowhood *per se* does not necessarily lead to increased poverty and thereby to an increased risk of mortality.

To completely exclude this possibility, it would be necessary to have information on economic status before the transition from being married to being widowed and subsequently for each year of observation until the individual died or was censored.

More generally, because of data constraints (which are shared by most datasets) we cannot exclude the effect of selection into various marital states on the basis of survival potential. It is quite possible that some of the increased mortality associated with being widowed or divorced relative to being currently married is due to adverse selection into widowhood or divorce on the basis of bad health; that is, widowhood or divorce is not random and unhealthy currently married people are more likely to make those transitions than their healthier currently married counterparts. To fully explore this possibility would require information on initial health status before the transition from the currently married state to the widowed or divorced state.

Finally, aside from the economic changes associated with widowhood and divorce and the effect of selection into those states, it is also important to note that changes in lifestyle associated with widowhood or divorce have been shown to have a significant effect on mortality differentials by marital status (Berkman and Syme 1979; Blazer 1982; Shoenenbach et al. 1986; Bowling 1987). The significant residual excess mortality for widowed and divorced individuals that persists in our models despite controlling for health and economic status can perhaps be attributed to our inability to capture the effects of lifestyle changes.

References

Allison, P.D. 1982. Discrete-time methods for the analysis of event histories. Pp. 61-98 in *Sociologic Methodology*, ed. S. Leinhardt. San Francisco: Jossey-Bass.

Allison, P.D. 1984. *Event History Analysis: Regression for Longitudinal Event Data*. Beverly Hills: Sage Publications.

Berkman, L.F. and L.S. Syme. 1979. Social networks, host resistance and mortality. *American Journal of Epidemiology* 109:186-204.

Blazer, D.G. 1982. Social support and mortality in an elderly community population. *American Journal of Epidemiology* 115:684-694.

Bowling, A. 1987. Mortality after bereavement: a review of the literature on survival periods and factors affecting survival. *Social Science and Medicine* 24:117-124.

Cain, M. 1984. Women's status and fertility in developing countries: son preference and economic security. World Bank Staff Working Papers No. 682. Washington DC: World Bank.

Cain, M. 1985. The fate of the elderly in South Asia: implications for fertility. Pp. 279-291 in *International Population Conference, Florence, 1985*. Vol 4. LiŠge: Ordina.

Cain, M. 1986. The consequences of reproductive failure: dependence, mobility, and mortality among the elderly of rural South Asia. *Population Studies* 40:375-388.

Chen, L.C., E. Huq and S. D'Souza. 1981. Sex bias in the family allocation of food and health care in rural Bangladesh. *Population and Development Review* 7:55-70.

Gove, W.R. 1973. Sex, marital status and mortality. *American Journal of Sociology* 79:46-67.

Helsing, K.J., G.W. Comstock and M. Szklo. 1982. Causes of death in a widowed population. *American Journal of Epidemiology* 116:524-532.

Helsing, K.J. and M. Szklo. 1981. Mortality after bereavement. *American Journal of Epidemiology* 114:41-52.

Helsing, K.J., M. Szklo and G.W. Comstock. 1981. Factors associated with mortality after widowhood. *American Journal of Public Health* 71:802-809.

Hu, Y. and N. Goldman. 1990. Mortality differentials by marital status: an international comparison. *Demography* 27:233-250.

Menken, J., J. Trussell, D. Stempel and O. Babakol. 1981. Proportional hazards life table models. *Demography* 18:181-200.

Shah, F. and M. Koenig. 1988. Longitudinal data files for the Matlab Demographic Surveillance System. The 1974-1982 YETI FILE Final Report*.* Manuscript prepared by ICDDR, B, Dhaka and Johns Hopkins School of Hygiene and Public Health, Baltimore.

Shoenenbach, V.J, B.H. Kaplan, L. Fredman and D.G. Kleinbaum. 1986. Social ties and mortality in Evans County, Georgia. *American Journal of Epidemiology* 123:577-591.

United Nations. 1986. *World Population Prospects: Estimates and Projections as Assessed in 1984*. New York.

Health Transition Review 7, 1997, 13-20

Sexual behaviour in a fishing community on Lake Victoria, Uganda

H. Pickering, M. Okongo, K. Bwanika, B. Nnalusiba and J. Whitworth

[a]*Medical Research Council/UVRI, Box 49, Entebbe, Uganda*

Abstract

This study describes the sexual behaviour of men and women in a fishing village on the shores of Lake Victoria in southwest Uganda. The village is near a well known trading town-truckstop on the main trans-Africa highway with a high recorded prevalence of HIV infection. Data were obtained on the daily travel and sexual activities of 26 women and 54 men with particular attention paid to the rate of partner change and the proportion of sexual contacts with people outside the village. During a total of 587 person-weeks the men made 1086 trips, mostly returning home the same day. They had a total of 1226 sexual contacts, most of which occurred either in their own village (83%) or a neighbouring fishing village (11%); 17 per cent of sexual contacts were with new partners. Fifteen of the women described themselves as married; 42 per cent of their sexual contacts were with casual, paying partners. Of the eleven women who were single, between 80 and 100 per cent of contacts were with paying partners. Most of the women's partners were resident in the village. These data show a very high rate of sexual mixing within the village but little contact with people from outside. This suggests that all sexually active men and women in the village are at high risk of STDs including HIV. There is currently no formal health care available in the village. Such communities should be targeted in future STD control programs.

HIV prevalence in Uganda as a whole ranges from about 30 per cent in some urban centres to less than five per cent in more remote areas (Uganda AIDS Commission 1994). A number of studies have reported significant differences in HIV prevalence between rural areas, roadside villages and urban centres within the same district (Killewo et al. 1990; Wawer et al. 1991; Barongo et al. 1992; Killewo, Dahlgren and Sandstrom 1994; Shao et al. 1994). There has been some debate on the extent and speed with which HIV infection is diffusing out from urban to rural areas (Anderson et al. 1992; Garnett and Anderson 1993; Pickering et al. 1996).

The first cases of AIDS in Uganda were identified in fishing villages on the shores of Lake Victoria in 1985 (Serwadda et al. 1985). Since this date there have been many glancing references in the media, conference abstracts and elsewhere to high rates of HIV infection in fishing communities in east Africa (Over and Piot 1993; Pool, Washila and Maswe 1995; Barongo, Senkoro and Boerma 1995; Ali et al. 1995), but there have been few published studies of sexual behaviour or HIV seroprevalence in these communities.

This paper reports on the sexual behaviour of both men and women in a fishing village and the extent to which they mixed sexually with people living in the town and further afield.

Location

The study was located in a fishing village five kilometres from a trading town on the main trans-Africa highway which had an HIV prevalence of 40 per cent in 1991 (Nunn et al. 1996). The village is built on the edge of a swamp about one kilometre from the landing site. With an adult population of approximately 250 it is slightly larger than, but otherwise typical of the many fishing villages dotted along the shores of Lake Victoria from which men fish in small, one-man canoes.

The village consists of just over 100 wattle-and-mud houses with one or two rooms, ten bars of similar construction and a few small shops selling cigarettes and basic household goods. There are three carpentry shops making fishing boats and paddles and two tailors who live part of the week in the fishing village and the remainder in the trading town. There are no health facilities or pharmacies and no bicycle-repair shops or other urban facilities. As it is near the trading town many needs are served by regular visits from itinerant traders selling consumer goods such as traditional and modern medicines, hardware and secondhand clothes. Many residents make frequent visits to the town by foot or bicycle. There are no motor vehicles in the town.

Sampling and data collection

Twenty-six women and 54 men were recruited into a longitudinal study of their sexual behaviour. Initially women who identified themselves as selling sex were recruited using a snowball technique. As the study progressed women whose status was observed to be rather more ambiguous were invited to join and during the final weeks those who were identified as spouses of men in the study became participants. The men were recruited using a snowball technique in the village and at the landing site. Recruitment of both men and women continued throughout the study producing a rolling sample with individuals dropping out after participating for around 12 weeks.

Data were collected over a six-month period by two field workers resident in the trading town. Following verbal agreement a short socio-demographic questionnaire was administered. Thereafter each participant was seen three or four times a week when data were recorded by the fieldworkers in a diary of their daily sexual activity and movements in and out of the village. Movement data included where they travelled during the day and slept each night. Data for each sexual contact included use of condoms; gifts or money exchanged; if the encounter was with someone from the village or an outsider; and whether with a regular or casual partner. The casual partners of men were further differentiated into new partners or ones with whom they had had previous sexual contact.

There have been many debates on the accuracy of self-reported behaviour. The advantage of using diaries rather than cross-sectional studies has been discussed elsewhere (Pickering et al. 1992). In this study the regular collection of data, the provision of comprehensive medical care within the research program, together with frequent informal observation of behaviour both by day and in the evenings, led to the formation of close relationships between the data-gatherers and the study participants which in many instances resulted in information being obtained from more than one source.

Condom use was encouraged and condoms distributed liberally on demand. Where necessary medical treatment was provided by the research program.

Results

Women

Twenty-six women participated in the study for a total of 421 women-weeks, an average of 16 weeks each. Of the six who participated for less than ten weeks, one died, two moved to the trading town and three to rural villages. Two returned after several weeks' absence.

The mean age of the women was 27.8 years with a range of 17-40. All but one were Christian. Fifteen had some primary education while eight had no education and three secondary education. With the exception of one woman aged 17 years all had children living with them. Twelve women had no economic activity other than domestic work and the sale of sex, six farmed, three dried and sold fish, three worked in bars and two owned shops. Only one had been born in the village, 24 had come from rural areas and one from a small town. The mean length of time in the village for those born elsewhere was three and a half years with a range from two months to 15 years. Half of those born outside had lived in urban areas before coming to the village.

Fifteen of the women described themselves as 'married', one to a man who lived in Kampala. Definitions of a husband or regular partner were imprecise. They included a man with whom a woman shared a house, or had a longstanding economic relationship, children in common or a sexual relationship of more than a few weeks. All those who said they were married regularly had casual sexual partners; indeed 42 per cent of married women's sexual contacts were with a casual, paying client. Six of the eleven who described themselves as single had one-fifth of their sexual contacts with a 'regular partner'. The five remaining single women had only casual clients. In all cases the participant's own definition of casual or regular partner was used.

The 'husbands' in the study were mostly fishermen who worked four or five nights a week. A certain amount of casual sex with married women took place while their husbands were fishing, but brief encounters also occurred in places such as banana plantations or while collecting water. One husband was a tailor who lived three or four nights in the fishing village and the remainder in the trading town. His 'wife' ran a bar in the village and when he was away had paying sexual partners. Only the woman whose husband lived in Kampala frequently left the village for sex. She had a number of 'boyfriends' who collected her in a taxi and took her to the trading town for the evening.

A total of 1671 sexual contacts were recorded; 41 per cent with regular partners and the remainder with casual contacts. Overall nearly three-quarters of all contacts were with fishermen (72%), 13 per cent with businessmen and the remainder with unskilled men (6%), skilled men (6%), fishmongers (2%) and less than 1 per cent with drivers, farmers or beer sellers. With the exception of the one businessman from Kampala, with whom four per cent of all regular contacts occurred, regular contacts were with either fishermen (81%) or skilled workers (15%). All contacts with unskilled men (95), fishmongers (30), drivers (12), farmers (6) and beer sellers (3) were casual (Table 1).

Ninety per cent of all contacts were with men resident in the village, five per cent with men from the trading town and three per cent from other fishing villages. Very small numbers were with men from rural areas or other urban centres. Nearly all regular contacts were with men resident in the village (91%) the remainder included the husband from Kampala (4%) and one regular partner from another fishing village (5%) (Table 2).

Gifts or money were reportedly given for nearly all sexual contacts with both regular and casual partners. The majority of contacts with regular partners were remunerated with gifts (75%) whereas money was more commonly given for casual contacts (77%). Only ten (1%) casual and 35 (5%) regular contacts did not receive either cash or a gift in exchange for sex.

The most common gift was food, usually fish (82%), followed by beer (17%). Over Christmas ten of the married women received a wide variety of food, clothes and other consumer goods (Table 3). The mean cash payment was just over US$1 with a range from 30 cents to $5.

The women claimed to use condoms in 93 per cent of the 982 contacts with casual partners and never with the 689 regular contacts.

Table 1
Occupation of casual and regular partners of women

Occupation	Type of partner					
	Regular		Casual		Total	
	N	%	N	%	N	%
Beer seller			3		3	
Businessman	28	4	190	19	218	13
Driver			12	1	12	1
Farmer			6		6	
Fisherman	559	81	645	66	1204	72
Fishmonger			30	3	30	2
Skilled worker	102	15	1		103	6
Unskilled worker			95	10	95	6
Total	689		982		1671	

Table 2
Place of residence of casual and regular partners of women

Residence	Type of partner					
	Regular		Casual		Total	
	N	%	N	%	N	%
The village	630	91	866	88	1496	90
Trading town			77	8	77	5
Fishing village	33	5	16	2	49	3
Rural			17	2	17	1
Kampala	27	4	1		28	2
Urban			4		4	
Total	690		981		1671	

Men

Fifty-four men participated in the study for a total of 587 man-weeks, an average of eleven weeks each. Thirty-seven were fishermen, eight fishmongers, three ran bicycle taxis between the village and the trading town and one a boat taxi. Two had occupations related to fishing; guarding and building boats. There was one tailor, a cattle herder and a farmer.

Thirty-eight men lived in the fishing village, twelve in the trading town, two in neighbouring fishing villages and two in rural villages. Only two of the men had been born in the village, the remainder having lived there for between one month and 30 years with an average of 6.4 years.

All the fishmongers lived outside the village; six in the trading town and two in rural villages. Those from rural areas cycled to the landing site early in the morning to buy fish which they sold in villages along the road on their way home. Those who lived in the trading town bought larger quantities of fish which they carried to the town on bicycles for transfer to vehicles and sale in more distant urban markets.

Twenty-four of the men were married, 14 to women in the study. Their average age was 30.7 years with a range of 18-52 years. Nearly two-thirds had some primary education while 15 had no education and six some secondary education. Forty-eight were Christian and six Muslim.

Cash payment was reportedly given for 1035 (84%) contacts with casual partners but only 35 (4%) of those with regular partners. The average payment was just over US$1 with a range from 50 cents to $3. One hundred and sixty-three casual and ten regular contacts were remunerated with a gift alone, usually fish or beer, while three regular and 26 casual contacts received both a gift and cash (Table 3).

Table 3
Gifts and/or cash reportedly given by men and received by women for regular and casual sexual contacts

	Men				Women			
Type of partner	Regular		Casual		Regular		Casual	
Remuneration	N	%	N	%	N	%	N	%
Gift	10	1	163	13	515	75	112	11
Gift & cash	3		26	2	43	6	105	11
Cash	35	4	1035	84	96	14	755	77
Nothing	803	95	2		35	5	10	1
Total	851		1226		689		982	

Both men and women reported the exchange of cash in a high percentage of sexual contacts with casual partners (84% and 77% respectively). Women however reported a high proportion of regular contacts receiving a gift (75%) and/or payment (20%), while men reported paying cash or giving a gift in only five per cent of regular contacts. This discrepancy appeared to be in the interpretation that men and women put on the relationship between sex and material support. Men assumed that the provision of food and cash was part of a wider relationship with their regular partner while women associated sex much more directly with the acquisition of material goods. Fish was the gift most commonly given and this was usually cooked by the woman and shared between both partners. Other domestic services performed by women for regular partners included sweeping the house and caring for children. Laundry was often done by men themselves when they were at the lake. All activities concerned with fishing, such as repairing of nets, were performed by men. If study participants became seriously ill they either returned home to their natal families or were cared for by friends or neighbours of the same sex.

A total of 1086 trips were recorded, an average of 1.9 trips a week. The majority were made by the fishmongers who worked four or five days a week and the men who lived in the trading town and travelled to the village for work. The majority of trips made by men who lived in the village were to the trading town (56%) or other fishing villages (26%), a further 16 per cent were return trips after nights away, mainly in other fishing villages. Only four trips were made to a rural area and five to an urban centre. Men who lived in the trading town travelled mainly to the fishing village (71%) with a further 14 per cent of trips to rural areas, mainly selling fish. Rural fishmongers moved between the fishing village and rural villages; on two occasions a stop-off was made in the trading town (Table 4).

Table 4
Place of residence and destination of trips by men

Destination	Residence

	Fishing village		Trading town		Rural		Total	
	N	%	N	%	N	%	N	%
The village			422	71	34	37	456	42
Trading town	219	56			0		219	20
Other fishing village	103	26	20	3	0		123	11
Rural	4	1	81	14	59	63	144	13
Urban	5	3	43	7	0		48	4
Home	63	16	33	5	0		96	8
Total	398	36	599	55	93	7	1086	

Of the 4109 nights of the study only 186 (5%) were spent away from a man's place of residence. The majority of these (74%) were in other fishing villages or the trading town (20%). Only seven nights were spent in a rural area and five in other urban centres.

A total of 2077 sexual contacts were recorded over a period of 587 person-weeks, an average of 3.5 contacts a week. Of these 851 (41%) were with regular partners and 1226 with casual partners. Three hundred and fifty-three contacts (17%) were with new partners. These men were having an average of one new partner every 12 days or about 30 new partners a year. The acquisition of new partners was fairly evenly spread: all the men had at least one new partner during the study and only two had less than three over a minimum of a ten-week period. It was common for men to have one or two contacts a week with a regular partner and one or two with different casual partners.

In spite of the high rate of partner change there was little mixing between the fishing village and other locations; 83 per cent of all sexual contacts occurred in the man's home. Of the men who lived in the fishing village 85 per cent of contacts were in the village, eight per cent in fishing villages where they did not live, six per cent in the trading town and the remainder in rural or other urban areas. The men who lived in the trading town had 80 per cent of contacts in the town, 18 per cent in a fishing village and the remainder in rural or urban areas. The rural fishmongers had 83 per cent of contacts in their home village, 13 per cent in a neighbouring village and the remaining four per cent in the trading town or fishing village. Overall only one per cent of contacts were between a man from the fishing village or the trading town and a woman in a rural area (Fig. 1).

This group of men were very reluctant to use condoms. They nearly all believed that they were HIV-positive and saw no point in protecting themselves or others. Condom use was never reported with regular partners. As the study progressed and contact with the study team became routine there was an increase in reported condom use with casual partners and the frequency with which condoms were spontaneously requested suggests that their use had become more common. But a desire to please the data collectors almost certainly inflated their reports. In the first six weeks of the study reported condom use was less than 30 per cent with casual partners; this gradually increased to over 80 per cent in the last six weeks of the study. Overall condoms were said to have been used for 67 per cent of contacts with new partners and 61 per cent of other casual contacts.

Discussion

Both men and women in this fishing community claimed to have a high number of both concurrent and sequential partners. Most men had three different partners a week, one of whom was usually a regular partner. All the women, even those who stated that they were married, regularly had sexual contact with casual, paying customers. This behaviour may not have been overtly condoned by the community but it was certainly tolerated. When one man became belligerent on returning home unexpectedly to find his wife with another man the community sided with the woman; it was considered normal for women to have casual partners if their husbands were away for a few days.

As with a previous study describing sexual networks between the trading town and surrounding agricultural areas, there was very little sexual mixing between people resident in different areas (Pickering et al. 1996). This was in spite of a high level of daily communication between the trading town and the village.

Everyone in the study was familiar with AIDS and how it is transmitted. Indeed national education programs have been so efficient in transmitting the message that one contact with an infected individual can lead to AIDS that nearly all participants believed they were already infected. This led to a high level of fatalism and discouraged condom use. To some extent we think we were able to overcome this by persuading people of the disadvantages of contracting other sexually transmitted diseases. This was probably one reason for the increase in reported condom use during the period of the study. It was curious that, given the acknowledged high rate of partner change, both men and women claimed never to use a condom with a regular partner. The discrepancy between reported condom use with casual partners by men and women (over 90% by women compared to only 61% by men) may be due to the women trying harder to please the research team or to a higher level of bravado on the part of the men. It must be noted, however, that they were not necessarily referring to the same sexual acts; each participant had contacts with people who were not part of the study.

The high level of sexual mixing and relatively low level of condom use within this small community makes it very likely that STDs, including HIV, will spread rapidly to all sexually active adults. The small number of people who move out of the fishing community or have sexual contacts outside will facilitate the spread of HIV infection to other communities. Given the high rate of partner change it is fortunate that there is such a low level of mixing between such villages and other communities. This may help to largely contain sexually transmitted infections within small groups that are geographically demarcated. Villages such as these should perhaps be the focus of specific health interventions and should not be excluded from general population surveys. Perhaps future education messages should emphasize that in virtually all communities the majority of people are HIV-negative and that it is worth having a test and taking precautions in the future. As counselling and testing facilities become more widespread this recommendation is not unrealistic.

References

Ali, A.K., A.M. Shein, A.A. Othman and H.S. Nassor. 1995. A pilot study on migrating fishing as a potential exposure to HIV/AIDS transmission: Zanzibar experience. Paper presented at Ninth International Conference on AIDS and STD in Africa, Kampala. Abstract TuC590.

Anderson, R.M., R.M. May, M.C. Boily, G.P. Garnett and J.T. Rowley. 1992. The spread of HIV-1 infection in Africa: sexual contact patterns and the predicted demographic impact of AIDS. *Nature* 352:582-589.

Barongo, L.R., W. Borgdorff, F.F. Mosha, et al. 1992. The epidemiology of HIV-1 infection in urban areas, roadside settlements and rural villages in Mwanza region, Tanzania. *AIDS* 6:1521-1528.

Barongo, L.R., K.P. Senkoro and J.T. Boerma. 1995. HIV infection and sexual behaviour in four fishing villages, Lake Victoria, Tanzania. Paper presented at Ninth International Conference on AIDS and STD in Africa, Kampala. Abstract Tuc588.

Garnett, G. and R.M. Anderson. 1993. No reason for complacency about the potential demographic impact of AIDS in Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 87 (Supplement 1):19-22.

Killewo, J., L. Dahlgren and A. Sandstrom. 1994. Socio-geographical patterns of HIV-1 transmission in Kagera region, Tanzania. *Social Science and Medicine* 38:129-134.

Killewo, J., K. Nyamuryekunge, A. Sandstrom, et al. 1990. Prevalence of HIV-1 infection in the Kagera region of Tanzania: a population based study. *AIDS* 4:1081-1085.

Nunn, A.J., U.H. Wagner, M. Okongo, S. Malamba, J. Kengeya-Kayondo and D. Mulder. 1996. HIV-1 infection in a Uganda town on the trans-Africa highway: prevalence and risk factors. *Journal of STDs and AIDS* 7:123-130.

Over, M. and P. Piot. 1993. HIV infection and sexually transmitted diseases. Pp 455-527 in *Disease Control Priorities in Developing Countries*, ed. D.J. Jamieson, W.H. Mosley, A.R. Measham and J.L. Bobadilla. Washington DC: World Bank.

Pickering, H., M. Okongo, K. Bwanika, B. Nnalusiba and J. Whitworth. 1996. Sexual mixing patterns in Uganda: small time rural/urban traders. *AIDS* 10:533-536.

Pickering, H., J. Todd, D. Dunn, J. Pepin and A. Wilkins. 1992. Prostitutes and their clients: a Gambian survey. *Social Science and Medicine* 34,1:75-88.

Pool, R., R. Washila and M. Maswe. 1995. Promiscuity, acquiescence and exchange. Sexual relationships in the fishing villages of Magu district, Tanzania. Paper presented at Ninth International Conference on AIDS and STD in Africa, Kampala. Abstract WeC260.

Serwadda, D., N.K. Sewankambo, J.W. Carswell, et al. 1985. Slim disease: a new disease in Uganda and its association with HTLV-III infection. *Lancet* iii:849-852.

Shao, J., G. Brubaker, A. Levin, et al. 1994. Population-based study of HIV-1 infection in 4,086 subjects in Northwest Tanzania. *Journal of Acquired Immune Deficiency Syndrome* 7:397-402.

Uganda AIDS Commission. 1994. *HIV/AIDS Situation Analysis*. Kampala.

Wawer, M.J., D. Serwadda, S.D. Musgrave, J.K. Konde-Lule, M. Musagara and N.K. Sewankambo. 1991. Dynamics of spread of HIV-1 infection in a rural district of Uganda. *British Medical Journal* 303:1303-1306.

Health Transition Review 7, 1997, 21-32

Female work participation and child health: an investigation in rural Tamil Nadu, India*

M. Sivakami

Department of Population Studies, Bharathiar University, Coimbatore - 641 046
Tamil Nadu, India

Abstract

This paper seeks to examine the linkage between mothers' work and child health. The data are from a survey of 75 working and 75 non-working women in a village in Tamil Nadu, India. The results show that the working women spend on an average 1.7 hours less than the non-working women on child care. The duration of breastfeeding also is shorter among the working women. The morbidity rates were higher for the children of working women than for the children of non-working women. Logistic regression analysis showed that the children of working women are at a significantly greater risk of morbidity even when socio-economic factors are controlled. The results, however, do not show a significant variation in morbidity by sex.

Traditionally a woman's place has been at home and a generation ago, her employment outside the home was looked down upon by the society. This situation has now changed and women have started seeking employment outside their homes through gross economic necessity followed by the desire to raise economic status, to have an independent income, to make use of education, to pursue a career etc. In rural areas, however, poor women may go to work mainly out of sheer economic necessity.

In the demographic literature, the discussion of the relationship between women's work and child mortality has almost always focused on paid employment outside the home. At low skills and in less developed economies, working women's additional income may be quite small. The mother's employment is seen as affecting the family through changes in care received by children. If the woman is working, she is likely to spend less time on feeding children, cleaning them, and playing with them. In the past, older siblings or grandparents were usually available to take care of young infants while the mother was employed; but because of social change and modernization, the extended family has become less common. All these factors may contribute to poor child health.

On the basis of a review of literature, Ware (1984) observed that women's economic activities will have an adverse effect on child care only where the activity is incompatible with child rearing or where the mother lacks access to another person able to care for the child. There is a possibility of child neglect and malnutrition due to an early abandonment of breastfeeding.

Very few studies in India have specifically investigated the effect of mothers' work on child health. However, a few analyses of child mortality have examined mothers' work

---

*The author would like to express her sincere thanks to Prof. P.M. Kulkarni, Head of the Department, Population Studies, Bharathiar University, Coimbatore, for his valuable suggestions and encouragement.

as one of the explanatory factors. Zachariah et al. (1994) found that in Kerala if a woman was working, the mortality risk for her child during infancy and childhood was higher than if she was not working, because the working woman had a shorter duration of breastfeeding and less time with the child. In a study of a slum population in Delhi, Basu and Basu (1991) also found higher risk of child mortality for working mothers at least in the poorest section of the population. On the other hand, an analysis of 1981 Indian census data showed a negative influence of female labour force participation on child mortality at the aggregate (state) level (Tulasidhar 1993).

A recent study examined the role of female employment in child care and health in greater detail (Desai and Jain 1994). It was found that in villages in Karnataka, children whose mothers are wage workers are less likely to be immunized and more likely to suffer from poor nutrition than children whose mothers are family workers or housewives. It was also found that the mother's time in specific activities such as feeding or bathing children does not differ much by work status, but the mother's leisure time is affected by her work. The study did not, however, examine child mortality.

There is a need to compare the time input on child care and the health of children of working and non-working women. The present study examines whether the work status of a mother has implications for child care and child health.

Method

Conceptually, the work status of women can affect child health because a working woman has less time to devote to child care. Therefore, it is necessary to examine how working and non-working women spend time on specific aspects of child care. Further, it is possible that the working women as a class are in a different socio-economic stratum. In particular, in rural India, the women from poor landless families are more likely to work than women from affluent landholding families. The latter may be able to provide better child care than the former because of better financial and possibly educational endowments. Therefore, to see whether work status *per se* has an influence on child health, it is necessary to control for household socio-economic factors.

In order to answer the research questions raised here, data on child care, various aspects of child health and household socio-economic background of working and non-working women are required. Given the resource constraints, it was decided to obtain such data by concentrating on a single village. For this purpose, a village in the Dindigul-Anna district of Tamil Nadu was chosen.

A preliminary listing of households in the village was carried out, and women who were normally engaged in economic activity during the previous year or the previous agriculture season were identified as working women. Almost all of them were engaged in agriculture and related activities. From these, 75 currently married women below the age of 45 were selected systematically for detailed study. Since most of the working women were wage workers, no further division into wage workers and family farm workers was made. Further, of the non-working women, 75 were selected in a similar manner.

A schedule was designed to obtain information on household characteristics, fertility history, time input on work and child care activities, and health for children below the age of 15 years. Given the smallness of the sample, it was felt that examination of child mortality differentials would not be possible. Hence, child health is assessed in terms of morbidity, that is, the incidence of an illness during a specified period preceding the survey. In most large surveys, the reference period for recording morbidity is one week or one month. But in a small sample, such a period would be too short as there would be very few incidences of disease within it. Hence, it was decided to adopt a longer period: one year for any illness, and three years for specific illnesses. Information on immunization, breastfeeding, provision of special diets, and treatment of a sick child was also obtained. The survey was carried out during December 1994.

Setting

The study village is of a medium size with a population of 3121 in 1991; it is 15 kilometres from the nearest town. There are no medium or small industries in or near the village and thus it has become possible to concentrate on a purely agrarian setting. The climate of the village is dry with very low rainfall; there are both irrigated and dry lands. Cultivation depends on rain and private wells; no river or canal irrigation is available. Only one crop such as maize is grown in dry lands, whereas in irrigated lands two or more crops such as groundnuts, onions, cotton, and chillies are grown.

A majority of the people in this village belong to the Kongu Vellala and Naicker castes which are the dominant agricultural communities in the region. These two communities own most of the land in the village and most others either work as labourers on their land or provide other services. Rice is the staple food and meat is consumed occasionally, once a week or month or during festival times. However, eggs are provided to the children more often. Almost all the households in the village have electricity, used mostly for lighting. Drinking water is available from taps, mostly at common points on street corners; a few wealthy households have private connections. But very few households have toilets. This village is on a bus route with frequent services to nearby towns.

The village has two nursery schools, two primary schools, one high school for boys and one higher secondary school for girls. One primary health centre (with two physicians) and two private dispensaries are located in the village and provide simple curative services. The primary health centre also provides immunization on a specified day every week in addition to family planning and maternal health care. Various government-sponsored nutrition programs, such as the Tamil Nadu Integrated Nutrition Programme (TNIP) and the Chief Minister's Noon Meal scheme, have been functioning in the village.

Profile of the sample

Of the 75 working women in the sample, five did not have a child at the time of survey, and were excluded from further analysis. Thus, the proceeding analysis is based on 145 women, 70 working and 75 non-working. A comparative view of the demographic and socio-economic characteristics of the two groups of women is presented in Table 1. It can be seen that the non-working women are younger than the working women on average. The mean age at marriage of non-working women is slightly higher than that of working women. The mean number of children ever born is higher among working women. The level of education is quite low among the working women. In contrast, a majority of the non-working respondents have completed at least five years of education. A greater proportion of the non-working women are from landholding families. As a result, while the husbands of most of the working women are engaged in agriculture as casual labourers, in the case of the husbands of the non-working women, a substantial proportion are cultivators or engaged in trade, transport and white-collar activities. Average annual household income of the non-working respondents is considerable: a larger percentage of non-working than working women's families have incomes exceeding Rs. 20,000. Broadly, the non-working women are in a higher socio-economic stratum of the rural society than the working women.

Table 1
Demographic and socio-economic characteristics of the two groups of women

	Non-working women	Working women
Age group	Percentage Distribution	
19-24	25.3	7.1
25-29	36.0	32.9
30-34	20.0	28.6
35-39	12.0	15.7
40-44	6.7	15.7
Total	100.0	100.0
Mean age (yrs)	29.2	32.0
Mean age at marriage (yrs)	20.7	20.1
Mean children ever born	1.9	2.2
Per cent literate	77.3	38.6
Mean annual household income (Rs.)	20,538	16,973
Per cent in landholding households	25.3	12.9
Mean land owned and/or cultivated (acres)	1.0	0.4
Per cent residing in *pucca* houses	69.3	38.6
Number of women	75	70

Nature of work by women

The main economic activity for the women is agricultural labour. There is little scope for household industry (weaving, basket making) in this area and hence the rural women depend on agricultural and occasionally construction activities for employment. This work is often seasonal and is casual, that is a woman desirous of employment must seek wage labour on a daily basis. The work is outside the home though mostly in the same village or in a neighbouring village. The working hours are generally from about 9 in the morning to 6 in the evening with a lunch break at midday. The wages are Rs. 15 to 20 per day (about US 50c) paid in cash.

In agricultural operations, woman do jobs like sowing seeds, harvesting, weeding, and transplanting, while men do the ploughing and digging. During the off-season women stay at home and sometimes they do jobs like collecting firewood or some other manual work at the landowner’s house. The working women, of course, also take care of their own household activities: cooking, cleaning, child care, bringing water. Most of the working women leave the children at home to be cared for by grandparents or elder siblings or other relatives. However, when a child is ill, some women forgo work to attend to the child. Some of the non-working women reported that they are not able to go to work as they have to take care of their children. Others said that it was due to the unwillingness of their husbands that they were not going to work. Further, traditionally, the upper castes do not send women to work outside the home and outside the village.

Results

The time spent on specific aspects of child care, in mean hours per day, is shown in Table 2. It can be seen that the working women spend only a little less time than the non-working women in feeding and bathing their children, but the non-working women, who have more time at their disposal, spend more time in playing with children which the working women cannot do.

Interestingly, as the number of children increases, such time spent by non-working women declines (details not shown in the table), because with more children the elder ones can entertain the younger, obviating the need for the mother to do so. The survey showed that working women spend on an average 2.4 hours less than the non-working women on child care.

Table 2
Time spent on child care by working and non-working women

Activities	Non-working women	Working women
Mean time spent in hours per day on:		
Bathing children	0.3	0.2
Giving food	0.5	0.4
Playing with children	2.5	0.7
All activities of child care	3.9	1.5

Most of the women were aware of the preventive measures of immunization and the coverage is nearly universal among children of both working and non-working women, especially for BCG and DPT immunizations. The coverage of measles immunization is also fairly high in both the groups, perhaps because the government immunization program is wide-ranging. Data on breastfeeding the last child were obtained; since some women were continuing breastfeeding at the time of the survey, some of the observations are truncated, so the life table approach was used to estimate the length of breastfeeding. Breastfeeding is discontinued earlier and the average duration of breastfeeding is shorter among working women (11.5 months) than among non-working women (14 months). It is generally felt that milk and eggs are nutritious and contribute to healthy child growth, but fewer children of working than non-working women get such nutritious food. The differences persist even when income is controlled for.

Information was obtained on whether a child suffered from any illness during the one-year period before the survey, and the incidence of specific illnesses such as fever, diarrhoea, jaundice and chickenpox during the three-year period before the survey. Fever (indicating some form of infection) was the most commonly reported illness and a majority of the children were affected during the three-year period (Table 3). Very few of the children of the non-working women suffered from diarrhoea, jaundice or chickenpox; the incidence was noticeably higher among the children of working women. Thus the children of working women appear to face a greater morbidity risk.

In the case of an illness, the child is generally taken to a clinic for treatment. Among the non-working women, the preference was for a private doctor whereas the majority of working women consult a government doctor. This is probably because the non-working women with their higher income can afford to consult a private doctor. Some working women forgo work for a day or so to attend a sick child, but 73 per cent continue to work even when a child is sick. In some cases, a family member, usually the mother-in-law, looks after the sick child. But in about half the cases, the child is kept home without any person to look after it.

Regression analysis

In the previous section, differences between working and non-working women's time spent on children, special food given, immunization coverage and morbidity were examined. In most cases, the gross differences, that is without any control for background variables, were presented. However, in an earlier section it was noted that the working and non-working women differ considerably with respect to income, education, landholding etc., factors which could also plausibly influence child care and health. Therefore, a multiple regression approach has been adopted to see the extent to which the work status of the mother influences child care and child health.

Table 3
Child health/care for children of working and non-working women

	Non-working women	Working women
Mean length of breastfeeding (in months)	14.0	11.5
Per cent children getting additional nutritious food	50.0	14.0
Per cent reporting incidence of any illness (during the preceding year)	49.2	91.1
Illness during last three years:		
Fever	81.3	91.1
Diarrhoea	3.8	20.0
Jaundice	3.8	14.6
Chickenpox	2.3	15.4

In the following analysis, a child care-health variable is taken as the dependent variable, and work status and relevant background variables as explanatory variables. The general model adopted is:

$$y = f(WS, X1, X2........) + e$$

where:
y = a child care or health variable,
WS = mother's work status,
X1, X2....... are relevant background variables, and
e = the error term.

The functional relationship is assumed to be of a linear type so that the model reduces to a multiple regression model. The primary interest is in the coefficient of the work status variable. The model is assumed to satisfy the usual conditions.

The background variables which may possibly influence child care-health are included. These are: (1) education of mother, (2) annual household income, (3) size of land holding, and (4) livestock ownership. In addition, the number of young children (below the age of 5 years) is also included as an explanatory variable, since the mother's time input is likely to be influenced by it.

Finally, when the dependent variable relates to child health, sex of the child is also included, since in the literature there has been considerable discussion on gender discrimination.

Two sets of analyses are carried out; one is for the time spent by women on child care. Here the individual woman is the unit of analysis. Three dependent variables are examined: total time spent per day on child care; time spent in playing with children; time spent in feeding the children.

The second analysis is for the individual child. Here the special food given to the child, coverage of measles immunizations and morbidity rates (any illness, fever, diarrhoea) are used as the dependent variables. Polio, DPT and BCG immunizations have not been included since the coverage of these has been found to be nearly universal. Further, the incidence of jaundice and chickenpox was very small so, for a sample of this size, it was decided not to include these as morbidity variables. Since all of these dependent variables are dichotomous in nature, instead of linear regression, logit regression has been used. The list of variables used in the two analyses is given in the Table 4 along with means and standard deviations.

Table 4
Variables used in regression analysis

A Unit of observation: Mother (n = 145) (Working mothers (W) 70; Non-working mothers (NW) 75)

Variable Name	Description	Mean			S.D.		
		All	W	NW	All	W	NW
CB 5	Total no. of living children below age 5 (actual number)	0.6	0.5	0.8	0.7	0.7	0.7
EDM	Education of mother (in completed years of schooling)	4.0	2.2	5.9	4.1	3.4	4.0
LND	Landholding by the household Dichotomous: No landholding = 0 Landholding = 1	0.19	0.13	0.25	0.40	0.34	0.44
LST	Livestock ownership by the household (Dich.): No livestock = 0 Livestock = 1	0.12	0.07	0.16	0.32	0.26	0.37
INC	Annual household income (in thousands of rupees)	18.8	17.0	20.5	14.3	15.4	13.1
TCR	Time spent on child care (in hours per day)	2.8	1.5	3.9	1.8	0.6	1.7
TPL	Time spent on playing with children (in hours per day)	1.6	0.7	2.5	1.2	0.5	1.0
TFD	Time spent on feeding the children (in minutes per day)	26.1	21.0	30.9	10.4	9.9	8.5

Table 4 continued
B Unit of observation: Child (n=270)(Children of working women (W) 136; Children of non-working women (NW) 134)

Variable Name	Description	Mean			S.D		
		All	NW	W	All	NW	W
EDM	Education of mother (in completed years of schooling)	3.9	5.7	2.1	4.1	3.9	3.3
INC	Annual household income (in thousands of rupees)	19.5	21.9	17.2	14.5	13.7	14.9
SEX	Sex of the child (Dichotomous): Male = 0						

	Female = 1	0.51	0.46	0.55	0.50	0.50	0.50
SPF	Special food (egg, milk) (Dich.):						
	Not given = 0						
	Given = 1	0.32	0.50	0.14	0.47	0.50	0.35
MSL	Measles immunization (Dich.):						
	Not given = 0						
	Given = 1	0.64	0.72	0.57	0.48	0.45	0.50
ILL	Any illness during the previous year (Dich.):						
	No = 0						
	Yes = 1	0.70	0.49	0.91	0.46	0.50	0.28
FER	Fever during the previous three years (Dich.):						
	No = 0						
	Yes = 1	0.86	0.81	0.91	0.34	0.39	0.28
DIA	Diarrhoea during the previous three years (Dich.):						
	No = 0						
	Yes = 1	0.12	0.04	0.20	0.32	0.19	0.40

Time spent on child care

As mentioned earlier, three indicators of child care are used. The regression results (Table 5) show that of the six variables considered only two, work status (WS) and number of children under five (CB5), have significant effects on the total time spent on child care. As expected, as the number of young children increases, the mother has to spend more time on them on child care. Working women spend on average two hours less than non-working women on child care. None of the education, income, landholding, or livestock variables showed any significant effect, though a large proportion of the variation in the dependent variable is explained (60%). The regression was rerun after deleting the non-significant variables. It can be seen that the R^2 did not drop much and the coefficients of the significant variable did not change notably. A similar analysis was carried out for the time spent by the mother on playing with her children. Once again, only two variables, WS and CB5, have a significant effect; working women spent an hour and a half less on playing with their children. The R^2 value is quite large, 67.7 per cent. Dropping the insignificant socio-economic variables makes little difference in R^2 or in the regression coefficients.

Table 5
Regression analysis for mother's time on children: summary results

	Dependent Variables				
Explanatory Variables	TCR		TPL		TFD
Regr. No.:	1	2	3	4	5
CB5- child under 5	0.846	0.923	0.560	0.568	7.068
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EDM	0.037	a	0.014	a	a
	(0.220)		(0.445)		
LND	-0.254	a	-0.057	a	a
	(0.405)		(0.753)		
LST	-0.383	a	-0.010	a	a
	(0.122)		(0.965)		
INC	-0.013	a	-0.001	a	a
	(0.122)		(0.891)		
WS- work status	-2.035	-2.035	-1.500	-1.536	-7.349
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cons	3.388	3.156	1.969	2.004	25.117
R^2	0.600	0.576	0.677	0.675	0.450

(n = 145). Note: a not included in the equation. Figures in parentheses are ‘p’- values.

Finally, time spent on giving food to children (recorded here in minutes) is also influenced positively by the number of young children and negatively by work status.

Child health and morbidity

The results of the logit regression analysis for a series of child health variables regressed on socio-economic variables and work status are given in Table 6. Note that this analysis is at the child level. Throughout the analysis, sex of the child, education of the mother, and household income are used as explanatory variables in addition to work status of mother. Two of the variables used in the earlier analysis, landholding (LND) and ownership of livestock (LST) are not used in the child level analysis, as these were felt to be less relevant especially since income is used as a variable. Besides, these two variables did not show any effect even in the analysis of mothers’ time. It should be noted that since the dependent variables are dichotomous, logit regression has been carried out. The magnitude of the logit regression coefficient does not have the same interpretation as in the case of conventional multiple linear regression, though the direction and significance of the coefficient has a meaning similar to that in linear regression.

From Table 6 it can be seen that WS has a negative and significant effect on logit of SPF. In other words, working women have less propensity to give special food like milk and eggs to children. Note that this is the case even when controlling for education and income. Incidentally, both education and income have significant positive effects on SPF as expected. The effect of sex is not significant.

Table 6
Logit Regression analysis for child nutrition, immunization and morbidity

	Dependent Variables				
Explanatory Variables	Special food	Measles immunization	Any illness during previous year	Fever	Diarrhoea
Regr. No.:	1	2	3	4	5
SEX	-0.384	-0.387	-0.182	-0.751	0.157
	(0.247)	(0.140)	(0.567)	(0.051)	(0.691)
EDM	0.103	0.044	0.118	0.153	-0.046
	(0.033)	(0.300)	(0.019)	(0.018)	(0.506)
INC	0.065	-0.011	-0.046	-0.045	-0.009
	(0.000)	(0.281)	(0.000)	(0.002)	(0.626)
WS	-1.427	-0.493	2.746	1.321	1.637
	(0.000)	(0.094)	(0.000)	(0.002)	(0.003)
Cons.	-1.770	1.111	0.382	2.055	-2.879
Log likelihood	-118.67	-170.97	-125.75	-98.26	-88.36
Chi-Square	100.56	9.50	76.66	19.24	19.82

(n = 270). Note: Figures in parentheses are ‘p’- values.

The regression for measles immunization shows that work status has no significant effect on the chances of being immunized; neither was the child’s sex found to have a significant influence. Note that the chi-square value is quite low in this logit regression. Finally, work status positively and significantly influences the risk of any illness, and specifically of fever and diarrhoea; the effect is more prominent in the case of illness in general, than in the cases of fever and diarrhoea; the chi-square values are quite small in the later regressions. In other words, the children of working women are more prone to illness even when socio-economic variables are controlled. As expected, rise in income lowers the risks, since the coefficients of the income variable are significant and negative. Sex of the child does not seem to have much influence except that the risk of fever is moderately lower for girls. Education of mother rather surprisingly has a positive effect on morbidity; possibly this is because education has a bearing on the perception of morbidity. It should be noted that the morbidity information is obtained from reports of mothers and more educated mothers may have a tendency to report minor episodes of illness which the less educated mothers may ignore. The limitations in using self- perceived (or perceived by mother as in the present case) morbidity measurement are well known (Murray and Chen 1994) and need no elaboration.

In examination of the differences between the child care and health indicators of working and non-working women, there was an apprehension that such differences need not necessarily be attributable to the mother’s work factor. An examination of the two groups had revealed that they differ substantially with respect to socio-economic background. But the regression analysis points towards a notable influence of mother’s work on child care and health. Even after controlling for key socio-economic variables, children of working mothers tend to receive less attention of the mother, and less special nutritious food, and are at a greater morbidity risk. Immunization, however, does not seem to have been affected by mother’s work.

Finally, a point about gender discrimination. The results in this study do not show that girls receive significantly less special food or have significantly higher incidence of disease than boys. In fact, in the case of fever, the girls face significantly lower risk. This may appear incongruent with the general impression that in India, girls are discriminated against in allocation of food and health care, and are at greater risk of morbidity than boys. However, it must be noted that the present study was in rural Tamil Nadu in south India. It is well recognized (see Karve 1968; Dyson and Moore 1983) that women have more autonomy and higher status in south India than in the north. In the southern states of India, including Tamil Nadu, female child mortality has actually been lower than male mortality (India, Registrar-general 1988). It has been observed earlier that the nature of sex bias in health care differs across different cultures, and differentials by sex are smaller in Tamil Nadu than in northern states (Basu 1990).

Implications of results

The regression analysis clearly shows that the children of working women are at a disadvantage compared to the children of non-working women. This is true especially in the case of morbidity and provision of special foods. But this need not necessarily imply that a woman's preference for work goes against the interest of her children. A working woman raises the household income which makes it possible to provide better food and health care to children as well as to others. This could partly, fully, or more than offset any adverse effect of work. However, trial computations of predicted values of probabilities of illness (obtained from the logit regressions) showed that even a rise of 10,000 rupees in household income does not compensate for the work effect. For example, the probability that a male child of an illiterate non-working woman with a household income of Rs. 10,000 will fall ill with diarrhoea is 0.05, whereas for the son of an illiterate working woman with a household income of Rs. 20,000 the probability is as high as 0.19. Not many women in rural areas can hope to earn as much as 10,000 rupees. Thus, it appears that a poor woman's decision to engage in economic activity, especially outside the home, is likely to adversely affect her child's health.

This is not to make a case against female employment. The additional income earned contributes to the household and should clearly promote a better standard of living overall. Employment provides a woman a degree of autonomy which positively contributes to the quality of life. Economic production by women contributes to the overall production of the society and economic development. What the results do suggest is that appropriate steps need to be taken to minimize any negative effect of mothers' work on child health. These could include provision of childcare facilities to rural working women. Strengthening of the nursery schools in villages and providing facilities for the care of very young children will be helpful. The entire burden of childbearing falls on the woman. But this need not be the case with child rearing. All members of the family could share the tasks of child care, freeing the mother to fully participate in economic production.

Certain limitations of the study should also be noted here. First, the sample size and coverage are small. We must see whether a large study yields similar results. Second, the two groups, working and non-working women, could represent two classes in the society and coefficients from pooled regressions may not reflect true effects in individual classes. However, separate regressions for working and non-working women did not show any differential effect on the dependent variables. The study is restricted to a rural area. Urban working mothers may possibly be able to make appropriate arrangements for good child care during their absence from home. It should also be seen how well institutional arrangements like creche services work. In spite of these limitations, the findings of the study clearly make a strong case for greater attention to be given to the children of working rural women. The women, burdened with the responsibilities of earning livelihood and caring for the family, find it difficult to devote adequate time to the children who face a heavy morbidity risk. As female participation in the labour force increases, the problem will become larger. This calls for adjustments at the familial level and policy measures at the societal level.

References

Basu, A.M. 1990. Cultural influences on health care use: two regional groups in India. *Studies in Family Planning* 21:275-286.

Basu, A.M. and K. Basu. 1991. Women's economic roles and child survival: the case of India. *Health Transition Review* 1:83-101.

Desai, Sonalde and Devaki Jain. 1994. Maternal employment and changes in family dynamics: the social context of women's work in rural south India. *Population and Development Review* 20:115-133.

Dyson, Tim and Mick Moore. 1983. On kinship structure, female autonomy, and demographic behavior in India. *Population and Development Review* 3:35-60.

India, Registrar General. 1988. *Census of India 1981, Occasional Paper No. 5 of 1988, Child Mortality Estimates of India*. New Delhi.

Karve, Irawati. 1968. *Kinship Organization in India*. Third Edition. Bombay: Asia Publishing House.

Murray, C.J.L. and L.C. Chen. 1994. Understanding morbidity change. In *Health and Social Change in International Prospects*, ed. L.C. Chen, Arthur Kleinman and Norma C. Ware. Boston MA: Harvard School of Public Health.

Tulasidhar, V. B. 1993. Maternal education, female labour force participation and child mortality: evidence from the Indian census. *Health Transition Review* 3:171-189.

Ware, Helen. 1984. Effects of maternal education, women's roles and child care on child mortality. *Population and Development Review* 10(Supplement): 191-214.

Zachariah, K.C., S. Irudaya Rajan, P.S. Sarma, K. Navneethan, P.S. Gopinathan Nair and U.S. Mishra. 1994. *Demographic Transition in Kerala in the 1980s*. Centre for Development Studies-Monograph Series. Trivandrum: Tilak Baker, CDS.

Health Transition Review 7, 1997, 33-60

Socio-demographic correlates, HIV/AIDS-related cofactors, and measures of same-sex sexual behaviour among Northern Thai male soldiers*

Andrew S. London[a], Mark J. VanLandingham[b] and Nancy Grandjean[c]

[a]*Department of Sociology, Kent State University, Kent, Ohio 44242-0001*

[b]*Department of Preventive Medicine and Community Health, University of Texas Medical Branch*

[c]*Population Index, Princeton University*

Abstract

We use data from an anonymous self-administered 1991 survey of military personnel in northern Thailand to estimate overall levels of and socio-demographic differentials in same-sex sexual behaviour in this population. Additionally, we examine the relationship between sexual experience with another male and a variety of outcomes relevant to HIV prevention and policy. Overall, 16.3 per cent of the sexually active soldiers report ever having had anal or oral sex with other males. Same-sex sexual behaviour in this sample is positively associated with several indicators of higher socio-economic status. All of the men who report having had sex with other men report having had vaginal intercourse with females as well. Comparison of our estimate of same-sex sexual behaviour with those obtained from two similar samples drawn in 1991 suggests that the lower estimates observed in the other two studies are largely due to differences in data collection methods. Regarding the HIV/AIDS-related outcomes we examined, men who have had sex with other men are significantly more likely than those who have not to have ever injected drugs, to personally know someone with HIV/AIDS, to have had sex with a female prostitute in the last six months, and to have had a sexually transmitted disease in the last six months. In this sample, men who have had sex with other men are also less knowledgeable about HIV/AIDS than are men who have not. These results are discussed in terms of their implications for HIV-prevention policy in Thailand.

According to a report published recently by the United Nations, Thailand is the first country outside of sub-Saharan Africa with estimated national HIV seroprevalence above one per cent (United Nations 1995). The HIV/AIDS epidemic in Thailand has been described as a series of 'waves of infection' sweeping across various strata of the population over time (Weniger et al. 1991; *Lancet* 1994; Brown et al. 1994). The first officially reported cases of

---

*An earlier version of this paper was presented at the annual meetings of the American Sociological Association, Washington DC, 19-23 August, 1995. Andrew S. London acknowledges support received from the NIMH-funded training grant 'Psychosocial Issues and Mental Health Services for Persons with HIV/AIDS' (5 T32 MH-19127). Mark VanLandingham acknowledges the support of a NRSA grant from NICHD (grant number F32HD07687). The survey was funded primarily by grants from Family Health International (AIDSTECH) and the World Health Organization. The assistance of Somboon Suprasert, and the comments of Charles Hirschman, Kenrad Nelson, and Taweesak Nopkesorn are also gratefully acknowledged.

HIV/AIDS in Thailand were diagnosed among homosexual and bisexual males, many of whom participated in prostitution (Phanuphak et al. 1985; Limsuwan, Kanapa and Siristonapun 1986; Traisupa, Chainarong, and Taylor 1987; Weniger et al. 1991). The relatively small number of cases of HIV/AIDS among men who have sex with other men reported at the onset of the epidemic was soon overshadowed by documentation of explosive growth in HIV infection rates among intravenous drug users and female prostitutes beginning in late 1987 (Vanichseni et al. 1989, 1991, 1992, 1993; Choopanya et al. 1991; Pokapanichwong et al. 1991; Weniger et al. 1991; Thanprasertsuk and Siraprapasiri 1991; Des Jarlais et al. 1992, 1994; Mann, Tarantola, and Netter 1992; Poshyachinda 1993; Mastro et al. 1994). After this rapid expansion of the epidemic, rates of HIV infection successively increased among male clients of female prostitutes, among the other female sexual partners and spouses of these men, and among infants born to infected women (Weniger et al. 1991; Brown et al. 1994). At present, the available evidence indicates that heterosexual activity is the dominant mode of HIV transmission in Thailand.

In Thailand, as in other countries, the emergence of HIV/AIDS has contributed to the expansion of data collection and research on sexual behaviour. Although considerably more is now known about sexual behaviour in Thailand than was the case a decade ago, research on the social organization of both heterosexual and homosexual behaviour in Thailand remains quite limited. Available evidence suggests that the social organization of heterosexuality in Thailand is structured by an expectation that men should be sexually experienced at marriage while women should not (Prasartkul et al. 1987; Klausner 1987; Muecke 1992), and by an emphasis on the male sexual drive (Keyes 1989; Deemar Corporation 1990; Erlanger 1991). Partly as a result of these cultural norms and beliefs, Thai male heterosexual behaviour is characterized by early and regular contact with female prostitutes. The first sex partner for most men is a female prostitute, and regular contact with prostitutes both before and after marriage is common (Swaddiwudhipong et al. 1990; Deemar Corporation 1990; Nopkesorn, Sungkorom, and Sornlum 1991; Nelson et al. 1993; Nopkesorn et al. 1993; VanLandingham et al. 1993; Beyrer et al. 1995).[1]

At present there are only a limited number of studies that report data on men who have sex with other men in Thailand (Sittitrai 1990; Pongthai 1990a, b; Weniger et al. 1991; Sittitrai, Brown, and Sakondhavat 1993; Beyrer et al. 1995; Kunawararak et al. 1995). These earlier studies have found that, compared with men who have sex with women only, men who have sex with other men have an earlier age at first intercourse, a higher total number of sex partners, and higher rates of visiting female prostitutes. Use of male prostitutes is also common. In Thailand, bisexuality, as opposed to exclusive homosexuality, appears to be the norm among men who have sex with other men.

Documented HIV infection rates are generally lower among men who have sex with other men than among injecting drug users and female prostitutes (Weniger et al. 1991; Nelson et al. 1993; Nopkesorn et al. 1993). According to Sittitrai et al. (1993), as a result of the relatively low rates of HIV infection among men who have sex with other men and a general reluctance to discuss homosexual behaviour, there has been less research attention focused on homosexual and bisexual men than on other populations at risk for HIV in Thailand.[2]

---

[1] For further discussions of the social organization of prostitution and socio-cultural attitudes towards prostitution in Thailand, see Phongpaichit (1982); Truong (1990); Muecke (1990, 1992); Weniger et al. (1991); Ford and Koetsawang (1991); Napaporn, Bennett, and Knodel (1993); Maticka-Tyndale et al. (1994); and Lyttleton (1994).

[2] Other researchers have also noted that male homosexuality and bisexuality in Thailand have been under-studied (Muecke 1992, Note 21:899; Lyttleton 1994:137).

In this paper, we use data from a survey of northern Thai soldiers to estimate overall levels and socio-demographic differentials in same-sex sexual behaviour in this population, and we compare these estimates with those from other studies that investigate comparable samples but employ different means of data collection. Additionally, we directly address the paucity of data on men who have sex with other men in the literature on HIV/AIDS and Thailand by examining the relationship between sexual experience with another male and a variety of outcomes relevant to HIV prevention and policy. More specifically, we examine the relationship between same-sex sexual behaviour and the following HIV/AIDS-related outcomes: injecting drug use, personally knowing someone with HIV/AIDS, having had sex with a female prostitute in the last six months, having had a sexually transmitted disease in the last six months, and HIV/AIDS-related knowledge.

Data and methods

The analyses presented in this paper are based on data collected in September and October 1991 from a sample of military personnel stationed in Chiang Mai Province in northern Thailand. The soldiers are a subsample of a larger study that included Chiang Mai University undergraduates and semiskilled-unskilled workers employed in Chiang Mai City (for additional detail on the larger study, see VanLandingham 1993). The analyses presented in this paper are based on a subsample of 512 soldiers between the ages of 18 and 24.[3]

The military subsample consists of all available soldiers, excluding first-year recruits, who were stationed at six army and air force bases in the province. We did not survey first-year recruits because they were involved in a separate study. In this paper, we focus on the subsample of military personnel in order to facilitate comparisons with two other studies of sexual behaviour and HIV risk among northern Thai military personnel that were also conducted in 1991 (Nopkesorn et al. 1993; Nelson et al. 1993). Comparison of the results obtained from these three studies is facilitated by the similarities among the samples; all three use data collected in 1991 from military personnel selected for service at northern bases by a national lottery.

The analyses presented in this paper are based on responses to a questionnaire that covered a variety of topics, including background characteristics; life-style factors; sexual behaviour and social influences on sexual behaviour; HIV/AIDS knowledge; attitudes toward HIV/AIDS; condom use; and drug and alcohol use. The primary objective of the study from which our data were obtained was to investigate patterns of *heterosexual* behaviour. Only one question was asked about same-sex sexual behaviour: ‘Have you ever had sex (anal or oral) with another male?’ Although our analysis of same-sex sexual behaviour is limited to responses to one fairly broad question, we believe that the paucity of information on men who have sex with other men in Thailand warrants careful analysis of all reliable data.

At each military camp, the soldiers completed the Thai-language questionnaires at the same time and location. All of the respondents read and completed the questionnaires themselves. Thai research assistants were available at each site to answer questions. All of the soldiers completed the questionnaire, which suggests that participation may not have been wholly voluntary. That participation was optional was emphasized in both written and verbal instructions; however, some respondents may have felt pressure to comply from their peers or superiors. Overall, response rates for individual questions were high (VanLandingham 1993).

Following a description of the sample, we begin our analysis with an examination of correlates of sexual inexperience among the soldiers. We then estimate the prevalence of same-sex sexual behaviour among the sexually active (sex with males, females, or both) and

---

[3] Data collected from 38 respondents aged 25 years or older were excluded from the analyses.

compare our estimates with those obtained from two other studies based on similar samples. Additionally, using descriptive statistics and multivariate logistic regression, we examine socio-demographic variation in the likelihood of ever having had sex with another male. The socio-demographic background variables included in our analyses are: age (18-21 versus 22-24 years); education (6 years or fewer versus more than 6 years); province of birth (Chiang Mai versus all others); and residence when growing up (urban versus rural).

In the second part of the paper, we use descriptive statistics and multivariate logistic and OLS regression to examine the effect of same-sex sexual behaviour on a number of HIV/AIDS-relevant outcomes. The outcome variables we consider are: injection drug use (ever versus never); personally knowing someone with HIV/AIDS (yes versus no); having had sex with a female prostitute in the last six months (yes versus no); having had a sexually transmitted disease in the last six months (yes versus no); and HIV/AIDS-related knowledge (measured by an 18-item scale; see Appendix A for details).

The sample includes 512 soldiers stationed at six different bases in Chiang Mai Province in Northern Thailand. Eighty-two cases (16%) were dropped from analysis because of missing data on one or more of the following socio-demographic and sexual behaviour variables: age, education, province of birth, residence when growing up, and ever had sex with a man. It is important to note that 50 cases were dropped because of missing data on education;[4] only seven cases were missing on ‘ever had sex with a man.’ Analyses presented in this paper are based on a final sample of 430 soldiers with complete data on these socio-demographic and sexual behaviour variables.

Results

The socio-demographic characteristics of the sample are summarized in Table 1. Most of the soldiers come from rural backgrounds, and nearly half were born in Chiang Mai, the province where they were interviewed.

Thirty-one of the 430 soldiers with complete data (7.2%) reported no sexual experience with either women or men. On average, soldiers who were not sexually experienced were significantly younger than those who were sexually experienced ($t = -3.52$ with unequal variances, $p < 0.01$) and had significantly higher educational attainments (chi square = 5.02, $p < 0.05$). The sexually inexperienced and experienced soldiers did not differ significantly by province of birth or urban-rural residence when growing up.

---

[4] The wording of this item was apparently confusing to many respondents.

Table 1
Selected socio-demographic characteristics of Northern Thai male soldiers (N=430), September-October 1991

Variable		Per cent	Number
Age	18-21 years	48.6	209
	22-24 years	51.4	221
Education	Six years or less	51.6	222
	More than six years	48.4	208
Province of birth	Chiang Mai	49.3	212
	All others	50.7	218
Residence when growing up	Urban	17.7	76
	Rural	82.3	354

Estimate of same-sex sexual behaviour among sexually experienced soldiers

By definition, sexually inexperienced men have not had sex with another man (or woman). Thus, we excluded the 31 soldiers who reported no sexual experience from the denominator of our estimate of same-sex sexual behaviour. Overall, 16.3 per cent (65/399) of sexually experienced soldiers reported ever having had sex with another man. The corresponding estimate based on the full sample, including the sexually inexperienced, is 15.1 per cent (65/430).[5] All of the sexually experienced soldiers who reported having had sex with a man also reported that they had had sex with a woman. The absence of exclusive homosexuality in this sample of soldiers is consistent with results from other studies of sexual behaviour among Thai men (Nopkesorn et al. 1993; Sittitrai et al. 1992; Pongthai 1990a, 1990b).[6] Nopkesorn et al. (1993) report a rate of 0.4 per cent sexually experienced with men only.[7] On the basis of data from the Survey of Partner Relations and Risk of HIV Infection in Thailand, Sittitrai et al. (1992) report that 0.2 per cent of males described their usual sexual experiences as involving men only. Pongthai (1990a, b) reports that 13 per cent of male Ramathibodi medical students have ever had sex with another male; however, only 0.9 per cent of the medical

---

[5] As noted previously, only seven soldiers failed to answer the question regarding ever having had sex with another man; however, because of missing data on other variables, we excluded a total of 82 cases from the analysis. Fifteen of the 82 soldiers dropped from the analysis because of missing data (18.3%) reported that they had had sex with another man. Thus, had we been able to keep these cases in the analysis, our overall estimate of same-sex sexual behaviour would be slightly higher than that presented in the text.

[6] The virtual absence of men who report exclusive homosexuality in these studies should not be taken to mean that exclusive homosexuality does not exist in Thailand. On the basis of a convenience sample of 157 men who have sex with other men from a municipal area of a large northeastern province, Sittitrai et al. (1993) report that 29 per cent of these men had ever had a female sexual partner, while the rest reported only male partners. Seventy per cent of these 157 men reported having had sex with a male prostitute.

[7] All of the estimates reported by Nopkesorn et al. (1993) are based on all men in their sample, including sexually inexperienced men. Adjustment of the denominators to exclude the 101 soldiers who reported being sexually inexperienced would result in somewhat higher estimates for all categories of sexual behaviour reported; however, even with such an adjustment, the rate of exclusive homosexuality would still be less than 0.5 per cent.

students were rated as having an exclusively homosexual orientation on the six-point scale developed by Kinsey, Pomeroy, and Martin (1948) to measure sexual orientation.

Comparison with estimates of same-sex sexual experience from Nelson et al. (1993) and Nopkesorn et al. (1993)

Problems associated with collecting data on sexual behaviour in general, and same-sex sexual behaviour in particular, have been discussed extensively in the literature (see for example Abramson 1992; Stokes and McKirnan 1993; Billy et al. 1993b; Laumann et al. 1994). While even socially accepted modes of sexual behaviour may be difficult to assess among some populations, this does not appear to be the case for young Thai men (VanLandingham et al. 1994).[8] Queries about same-sex sexual behaviour may, however, be more sensitive than those regarding heterosexual practices, since the former is to some degree stigmatized in Thailand (Jackson 1989, 1993; Sittitrai et al. 1993). As noted by Beyrer et al. (1995) in their recent discussion of underreporting of same-sex sexual behaviour among Thai male military recruits:

> Reporting of same-sex behaviours in this population appears to vary significantly with data collection techniques. Collection of valid data on same-sex activity in this, and other Thai and Asian populations, may require particular attention to confidentiality, interviewing techniques, and data collection instruments. Self-administered questionnaires may help overcome under-reporting of same-sex behaviours, although these require literate subjects (Beyrer et al. 1995:175).

As seen in Table 2, our overall estimate of the proportion who had ever had sex with another male is substantially higher than estimates for this same population reported in two previous studies (Nelson et al. 1993; Nopkesorn et al. 1993). Given that all three of these studies collected data from similar populations in the same year, the observed variation in estimates of same-sex sexual behaviour is potentially valuable for obtaining a better understanding of how methodological factors might influence the estimation of sensitive or stigmatized behaviour in Thailand. Consideration of potential biases in estimating rates of same-sex sexual behaviour, as well as other potentially sensitive issues, is not just an academic exercise. Such estimates are sometimes used for making policy decisions regarding programs and resource allocation. Ascertaining the validity and reliability of estimates of same-sex sexual behaviour, and other stigmatized and sensitive behaviours, is of critical importance for HIV/AIDS prevention and policy.

At least two domains of factors that might contribute to variations in observed estimates can be readily identified: differences in the samples and differences in methods of measurement. As seen in Table 2, each of these three studies collected data from military personnel in northern Thailand within a six-month period in 1991. Although there is substantial similarity across these three samples, a number of differences are also notable.[9]

---

[8] Among social and behavioural scientists, the high response rates obtained in recent national surveys of sexual behaviour in the United States and elsewhere have largely dispelled the notion that sexual behaviour cannot be studied systematically (for additional discussion of this issue, see Tanfer 1993; Laumann et al. 1994).

[9] To make comparisons with the other studies, we kept the sexually inexperienced in the denominators of all estimates presented in Table 2 unless otherwise noted.

Table 2
Comparison of this study with two previous studies conducted by Nelson et al. (1993) and Nopkesorn et al. (1993)

	This study	**Nelson et al. (1993)**	**Nopkesorn et al. (1993)**
Estimated proportion ever having had sex with another male:			
Excluding sexually inexperienced from denominator	16.3% (65/399)	3.3% (73/2229)	12.4% (126/1014)
Including sexually inexperienced in denominator	15.1% (65/430)	3.0% (732417)	11.3% (126/1115)
Sample description:	N=430	N=2417	N=1115
Dates of data collection	September-October 1991	May-November 1991	May 1991
Population sampled	All second-year recruits at six army and air force bases in Chiang Mai Province	Conscripts to two military training bases (one army, one air force) in Chiang Mai Province	Conscripts entering in Phitsanuloke Province in the lower north, one of several entry points for northern conscripts
Age	Mean=22.7 years Range=18-24 years	Mean=21 years Range=19-23 years	Mean=NA (about 21.2 years) Range=21-27 years (95.2% are 21 years old)
Education	48.4% had more than 6 years of school	31.4% had more than 4 years of education	29.9% had more than 6 years of education
Father's occupation	74.2% farmer or labourer	57.3% farmer or labourer	71.8% farmer
Ever injected drugs	6.7% had injected	1.2% had injected	2.3% had injected
Rates of Sexually Transmitted Disease (STD)	22.1% had STD in last 6 months	42.6% ever had STD	42.5% ever had STD
Ever visited female prostitute	86.5% had visited	81.1% had visited	74.7% had visited

Table 2 continued

Measurement issues:			
Outcome variable	Includes oral and anal sex	Not reported (‘history of ever having had sex with another male’)	Anal sex only
Data collection method	Anonymous, self-administered Thai-language questionnaire, completed in groups	Confidential, private face-to-face interview	Confidential, self-administered, Thai-language questionnaire, completed in groups of 100
Site of survey administration	On the military base	On the military base	NA (appears it was administered on the military base)
Serological screening for HIV antibodies	No	Yes	Yes

First, our sample consists primarily of second-year military recruits, while the other two studies are based on first-year military recruits. One effect of this difference is that the mean age of the soldiers in our sample is about one year older than the mean age in the other two samples. A second difference is that one sample was drawn at military bases in Phitsanuloke province in the lower north (Nopkesorn et al. 1993), while the other two samples were drawn in Chiang Mai Province in the upper north.

A third difference is that there appear to be some dissimilarities across the three samples with respect to education and father’s occupation. Our sample appears to be more highly educated than the other two samples.[10] Our sample is similar to that of Nopkesorn et al. (1993) with respect to father’s occupation, but dissimilar from that of Nelson et al. (1993), who report the lowest proportion with father’s occupation being a farmer or a labourer. Since it is likely that fathers with higher occupational status (i.e., not farmers or labourers) would tend to have more highly educated children, it is unclear how to reconcile these countervailing descriptive statistics.

Estimates of other potentially sensitive or stigmatized behaviour appear to be somewhat variable across the three studies. A higher proportion of our respondents report ever having injected drugs and having had sex with a female prostitute in the past six months than is the case in the other two studies. The estimate of injecting drug use reported by Nelson et al. (1993) is the lowest. Estimates of the proportion ever having a sexually transmitted disease reported in the other two studies are similar and are substantially higher than the estimate reported for our sample; however, our estimate refers to acquiring a sexually transmitted disease in the last six months only.

---

[10] As noted previously, the wording of the education question appears to have confused some respondents. Overall, 50 respondents did not provide usable data on education and were dropped from the analysis. Less well-educated and less literate respondents may have misunderstood the education question. Elimination of these persons from the sample would tend to bias educational attainment upward in the remaining sample.

As can be seen from the above discussion, there are some dissimilarities in these three samples, which indicates that there is a need for caution when making comparisons of the estimates derived from them. Differences in the samples may contribute to variations in the estimates of same-sex sexual behaviour obtained from these studies; however, consideration of the methods of data collection and measurement used in the three studies leads us to conclude that these factors had a far more substantial effect than did sample differences on variation in the estimates.

Keeping in mind problems of comparability resulting from sample differences, the gradient in the proportion reporting that they had ever had sex with another man that is observed across the three studies reflects the relative invasiveness of the data collection strategy (Table 2). Our study, which used an anonymous, self-administered questionnaire and asked specifically about anal and oral sex, obtained the highest estimate (16.3%). The study by Nopkesorn et al. (1993), which used a confidential, self-administered questionnaire and a more restrictive definition of same-sex sexual behaviour (anal sex only), obtained the second highest estimate (12.4%). The study by Nelson et al. (1993), which apparently used a broad but ambiguous definition of same-sex sexual behaviour (they do not report the exact phrasing) and employed confidential face-to-face interviewing, obtained by far the lowest estimate (3.3%). These differences in data collection may also account for the observed variations reported above in other sensitive behaviours: injecting drug use and recent patronage of female prostitutes.

The difference between the estimates obtained from our study and the Nopkesorn et al. (1993) study may be partly explained by differences in the questions regarding same-sex sexual behaviour in these two studies. According to Sittitrai et al. (1993), oral sex appears to be somewhat more frequent than anal sex among men who have sex with other men in Thailand: 74.8 per cent had ever received anally, 60.6 per cent had inserted anally, 83.9 per cent had received orally, and 73.5 per cent had inserted orally.[11] The low estimate obtained by Nelson et al. (1993) appears to be a function of using a face-to-face interview as opposed to a self-administered questionnaire to collect the data. This low estimate suggests that using a broad definition of same-sex sexual behaviour, as apparently was done by Nelson et al. (1993), is insufficient to counteract the dampening effect of a face-to-face interview format on the willingness of Thai male respondents to disclose sensitive behaviour.[12]

The degree to which same-sex sexual behaviour is stigmatized in Thailand is the subject of continuing debate. While many observers of Thai culture perceive a relatively high degree of tolerance for male homosexual relations, some researchers have suggested that estimates of same-sex sexual behaviour among Thai men ‘must be interpreted with caution since there are social pressures to keep same-sex behaviour secret, especially in rural areas where 80% of the Thai population lives’ (Sittitrai et al. 1993:262). Jackson (1989, 1993) argues that homosexuality is stigmatized in Thailand despite the fact that there are no legal or formal sanctions against it; evidence in support of his argument is derived both from a review of

---

[11] The most frequent behaviour reported by the men surveyed by Sittitrai et al. (1993) was masturbation with a male partner (88.4% masturbated a partner and 75.5% were masturbated by a male partner). If some men who have sex with other men only engage in masturbation, the estimates of same-sex sexual behaviour obtained from our sample and from Nopkesorn et al. (1993) are conservative. It is unclear whether Thai men would report this behaviour in response to a general question about having sex with another man, as was asked in the study by Nelson et al. (1993).

[12] For further discussion of these methodological issues, see Stokes and McKirnan 1993; Billy et al. 1993b; Laumann et al. 1994:57-63.

traditional Buddhist scriptures and from contemporary responses to the emergence of the HIV/AIDS epidemic. In discussing the possibility of underreporting of same-sex sexual behaviour in their study of male military recruits, Nelson et al. (1993:958) stated:

> In addition, a history of contact with another male is not considered grounds for disciplinary action nor is it a stigmatized behaviour in this population. Therefore, there may be less stimulus for under-reporting such activity in our subjects than might be the case in military recruits in the United States or other Western countries.

Subsequent work by some members of this group indicates a changing view of the potential influence of stigma and data collection methods on reporting of same-sex sexual behaviour (Beyrer et al. 1995). Importantly, this recent work illustrates how concerns over confidentiality and the military context might influence reported behaviour. In the study by Beyrer et al. (1995), use of civilian interviewers appears to have elicited much higher reports of same-sex sexual behaviour than was the case in the study by Nelson et al. (1993) (6.5 versus 3.0%). Moreover, discharged recruits followed up by civilian interviewers reported higher rates than those still in the military (9.3 and 6.5%, respectively).

The observed gradient in the estimates of same-sex sexual behaviour obtained from the three studies compared above is consistent with the view that this behaviour is fairly highly stigmatized among Thai soldiers. Researchers seeking to measure same-sex sexual behaviour in Thailand must take into account special sensitivities attached to this behaviour when designing their studies.

Socio-demographic correlates of same-sex sexual behaviour

A number of recent studies of male sexual behaviour in the United States and other developed nations have demonstrated that the likelihood of ever having had sex with another male is influenced by a number of socio-demographic characteristics, such as age, education, and location of residence (Fay et al. 1989; Rogers and Turner 1991; Billy et al. 1993a; Wellings et al. 1994; Laumann et al. 1994). To the best of our knowledge, the question of whether particular socio-demographic characteristics are differentially associated with same-sex sexual behaviour has not been addressed in the Thai context. Although we have only a limited number of socio-demographic background variables available for analysis, we examined the effects of these variables on the likelihood of ever having engaged in same-sex sexual behaviour.[13] As seen in Table 3, education and urban residence when growing up each have a significant bivariate association with ever having had sex with a male. Once other variables are taken into account, males who grew up in an urban area are twice as likely to report that they have ever had sex with another male than are those who grew up in rural areas; education becomes insignificant.

In preliminary analyses (not shown), we also examined the effect of father’s occupation on ever having had sex with another man. Father’s occupation is significantly associated with ever having had sex with another male at the bivariate level. Males who have fathers with higher-status occupations are twice as likely to have ever had sex with another male as are males whose fathers are farmers or labourers. We did not include father’s occupation in our analyses because it is too highly correlated with urban residence (r = 0.47), and inclusion of this variable did not significantly improve the fit of the model.

---

[13] A correlation matrix with each of the socio-demographic and HIV/AIDS-relevant variables considered in the remainder of this paper is presented in Appendix B. The correlations presented in Appendix B refer to the sexually experienced only (N=399).

Table 3
Logistic regression analysis of socio-demographic correlates of ever having had sex with a male, sexually active Northern Thai male soldiers (N=399), September-October 1991

	Ever had sex with a male			
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Age				
22-24 years	18.8	0.40 (0.28)	0.39 (0.28)	1.5
18-21 years	13.4	R.C.	R.C.	
Education				
More than six years	20.3	0.56* (0.27)	0.38 (0.29)	1.5
Six years or less	12.7	R.C.	R.C.	
Province of birth				
Chiang Mai	17.9	0.23 (0.27)	0.25 (0.28)	1.3
All others	14.8	R.C.	R.C.	
Residence when growing up				
Urban	27.5	0.85** (0.31)	0.71* (0.33)	2.0
Rural	13.9	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001 Note: R.C. is Reference Category.

The pattern of bivariate results observed in our data suggests that there is an association between higher socio-economic status and ever having had sex with another male; males whose fathers had higher-status occupations, males who grew up in urban areas, and males who have more than six years of education are more likely to have ever had sex with another male than are men in the respective reference categories. Each of these three indicators of socio-economic status has moderate to high correlations with the others. In another preliminary analysis not shown here, we scaled these three variables (scale range 0-3). Factor analysis indicated that these three variables load onto a single factor. Cronbach's alpha for the scale is 0.60, which represents acceptably high reliability for a scale with three component items. Controlling for age and province of birth, the socio-economic status scale is significantly associated with ever having had sex with another male (beta = 0.40, standard error = 0.13). Each unit of increase in the socio-economic status scale results in a 50 per cent increase in the likelihood of ever having had sex with another male. Men who have fathers with higher-status occupations, who grew up in urban areas, and who have more than six years of education are 3.3 times more likely to have ever had sex with another male than are men with none of these socio-demographic characteristics.

Two studies of same-sex sexual behaviour based on data from a sample of urban medical students indicate that among male medical students who had ever had same-sex sexual contact, most report that their first sexual contact with another male was 'incidental' rather than 'intentional' (62.9% versus 25.7%) (Pongthai 1990b),[14] and that their first experience

---

[14] Approximately 11 per cent of respondents gave responses that were coded as 'other'. It is not clear what these responses were; however, it is probable that forced sex was included in this 'other' category.

with another male occurred by the age of 20: 86.2 per cent by age 20, 36.2 per cent by age 16, and 18.9 per cent by age 13 (Pongthai 1990a). Of those who had ever had sex with another male, 32.4 per cent had done so in the current year (Pongthai 1990a, b). Taken together, the results reported in this paper and other available evidence suggest that one direction for future research is to investigate in more detail the effects of age, urban residence, socio-economic status, and other socio-demographic and social context variables on the initiation and maintenance of same-sex sexual behaviour among Thai men.

Men who have sex with other men and HIV/AIDS-related outcomes

One of the primary reasons for undertaking this study was to examine the relationship between same-sex sexual activity and other variables that are known to be related to the risk of HIV infection in Thailand or that are relevant for policy and planning. In this section of the paper, we examine the effect of same-sex sexual activity on the likelihood of ever having used intravenous drugs, the likelihood of knowing someone with HIV/AIDS, the likelihood of visiting a female prostitute in the last six months, and the likelihood of having had a sexually transmitted disease in the past six months.[15]

Tables 4, 5, 6, and 7 present descriptive statistics and the results of four separate logistic regression analyses, each with a different HIV/AIDS-related outcome. Each outcome is regressed on a variable measuring same-sex sexual activity (versus none) and the four socio-demographic background variables: age, education, province of birth, and residence when growing up.

Injecting drug use

Considerably more is known about injecting drug users in Thailand than is known about men who have sex with other men. (For a historical overview of opium use in Southeast Asia, see Poshyachinda 1993.). To date, we are not aware of any study that has systematically examined the interrelationship between same-sex sexual behaviour and injecting drug use. One paper comparing condom use with primary partners among injecting drug users in Bangkok and New York City reported that the number of injecting drug users with same-sex primary partners in both cities was too small to allow for meaningful analysis (Vanichseni et al. 1993).

Overall, 5.3 per cent of the sexually active men reported that they had ever injected drugs. As seen in Table 4, same-sex sexual activity and urban residence when growing up are significantly associated with the likelihood of ever having used intravenous drugs at the bivariate level; however, only same-sex sexual activity is significant in the adjusted model. Controlling for other variables, men who report having had sex with other men are 8.5 times more likely to have ever used intravenous drugs than are men who have never had sex with other men. The strong association between same-sex sexual behaviour and injecting drug use in this sample suggests the need for additional research on the intersection of these two populations.

In a different paper based on the same sample, 11.1 per cent of male medical students who had ever had sex with another male indicated that the motive for their first experience was ‘being forced’ (Pongthai 1990a).

[15] In the multivariate analysis, the cases that had missing data for the outcome variables were coded in such a way as to bias the results toward the null hypothesis.

Table 4
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of ever using intravenous drugs, sexually active Northern Thai male soldiers (N=399), September-October 1991

	Ever used intravenous drugs			
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	20.0	2.32*** (0.47)	2.13*** (0.49)	8.5
No	2.4	R.C.	R.C.	
Age				
22-24 years	6.1	0.37 (0.46)	0.19 (0.49)	1.2
18-21 years	4.3	R.C.	R.C.	
Education				
More than six years	7.5	0.86 (0.47)	0.30 (0.55)	1.3
Six years or less	3.3	R.C.	R.C.	
Province of birth				
Chiang Mai	5.6	0.14 (0.45)	0.10 (0.48)	1.1
All others	4.9	R.C.	R.C.	
Residence when growing up				
Urban	13.0	1.38** (0.46)	0.96 (0.54)	2.6
Rural	3.6	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001. Note: R.C. is Reference Category.

Personally knowing someone with HIV/AIDS

For a variety of reasons, consideration of social networks is fundamentally important for understanding sexual behaviour and the transmission of HIV (for a discussion of these issues see Laumann et al. 1993, 1994). Epidemiologically, personally knowing someone with HIV/AIDS may increase, decrease, or be unrelated to risk for HIV. On the one hand, if the known person is a sex or needle-sharing partner, engaging in *any* unsafe behaviour with that person increases risk. Owing to condom slippage and breakage, even safer sexual practices with an HIV-infected partner carry some risk (for a detailed discussion of this issue, see Laumann et al. 1994:391-396; Weller 1993). Because of selectivity related to risk for HIV infection and to the formation of social relationships, social networks that include one person with HIV/AIDS are likely to include others, only some of whom may be known to particular individuals. Thus, this variable may represent a proxy for closer proximity to persons with HIV/AIDS and increased risk for those who engage in unsafe behaviour. On the other hand, knowledge of another’s HIV serostatus may reduce risk by promoting changes in behaviour with that person as well as with others. Participating in social networks that include people with HIV/AIDS may also increase access to information about HIV/AIDS, thereby reducing risk. From a more social perspective, personally knowing someone with HIV/AIDS has implications for social support and caregiving during illness.

Overall, ten per cent of the sexually active soldiers reported that they personally knew someone with HIV/AIDS. At the bivariate level, same-sex sexual activity, having more than six years of education, and urban residence when growing up are each associated with personally knowing someone with HIV/AIDS; however, after taking other variables into account, urban residence when growing up becomes non-significant (Table 5). In the adjusted model, men who have had sex with other men are 3.1 times more likely to personally know someone with HIV/AIDS than are men who have not had sex with men. Men with more than six years of education are 5.7 times more likely to personally know someone with HIV/AIDS than are men with lower educational attainments.

Having had sex with a female prostitute in the last six months

Numerous studies document high rates of contact with female prostitutes among Thai males (Swaddiwudhipong et al. 1990; Deemar Corporation 1990; Nopkesorn et al. 1991, 1993; Nelson et al. 1993; VanLandingham et al. 1993). Men who have sex with men in Thailand are among those who visit female prostitutes (Sittitrai et al. 1993), and in fact, they may do so even more than do men who have sex with women only. Beyrer et al. (1995) report that men who have sex with other men are significantly more likely to have ever had sex with a female prostitute than are men who only have sex with women (95.5 versus 84.9%).[16]

Among soldiers in our Chiang Mai study, 67.7 per cent reported having had sex with a female prostitute in the last six months. At the bivariate level, same-sex sexual activity and age are significantly associated with having had sex with a female prostitute. Both of these remain significant in multivariate analysis, and once other variables are taken into account, education also becomes significant (Table 6). In the multivariate model, men who have had sex with other men are 1.9 times more likely to have had sex with a female prostitute in the past six months than are men who have never had sex with another male. Men who are 22-24 years old are 2.3 times more likely to have had sex with a female prostitute in the last six months than are men who are 18-21 years old. Higher educational attainment significantly reduces the likelihood of having had sex with a female prostitute in the past six months. Compared with men with six or fewer years of education, men with more than six years of education are about 40 per cent less likely to have had sex with a female prostitute in the past six months.

Table 5
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of knowing someone with HIV/AIDS, sexually active Northern Thai male soldiers (N=399), September-October 1991

	Know someone with HIV/AIDS			
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	23.1	1.31***	1.12**	3.1

---

[16] Pongthai (1990b) reports data on sex with prostitutes among homosexual men (51.96% ever and 33.33% in current year); however, it is unclear whether these estimates refer to male prostitutes, female prostitutes, or both.

		(0.36)	(0.38)	
No	7.5	R.C.	R.C.	
Age				
22-24 years	12.2	0.54	0.44	1.6
		(0.35)	(0.37)	
18-21 years	7.5	R.C.	R.C.	
Education				
More than six years	17.7	1.84***	1.74***	5.7
		(0.43)	(0.45)	
Six years or less	3.3	R.C.	R.C.	
Province of birth				
Chiang Mai	10.2	0.04	0.05	1.1
		(0.33)	(0.35)	
All others	9.9	R.C.	R.C.	
Residence when growing up				
Urban	17.4	0.82*	0.09	1.1
		(0.37)	(0.41)	
Rural	8.5	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001. Note: R.C. is Reference Category.

Sexually transmitted disease in the last six months

Although recent data indicate that sexually transmitted disease rates may be declining among Thai men (Hanenberg et al. 1994), rates of ever having had a sexually transmitted disease are high in this population.[17] As previously noted, two other studies of military recruits reported that approximately 43 per cent had ever had a sexually transmitted disease (Nopkesorn et al. 1993; Nelson et al. 1993). The suspected source of infection most frequently reported by heterosexual male STD clinic patients is female prostitutes (Suwangool et al. 1992). One recent study systematically examined the association between same-sex sexual behaviour and sexually transmitted diseases among northern Thai military conscripts. Univariate comparisons indicate that men who have sex with men are significantly more likely than are men who have sex only with women to have ever had a sexually transmitted disease, and to have had gonorrhoea, syphilis, non-gonococcal urethritis, penile discharge with pus, watery penile discharge, or dysuria (Beyrer et al. 1995).

Table 6
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of having had sex with a female prostitute in the last six months, sexually active Northern Thai male soldiers (N=399), Setember-October 1991

	Had sex with a female prostitute in last six months			
Variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	78.5	0.65*	0.66*	1.9

---

[17] For a historical overview of public and official responses to sexually transmitted diseases in Thailand from the 1930s to the present, see Bamber, Hewison, and Underwood (1993).

		(0.32)	(0.33)	
No	65.6	R.C.	R.C.	
Age				
22-24 years	76.1	0.83***	0.82***	2.3
		(0.22)	(0.22)	
18-21 years	58.1	R.C.	R.C.	
Education				
More than six years	63.1	-0.39	-0.50*	0.6
		(0.22)	(0.23)	
Six years or less	71.7	R.C.	R.C.	
Province of birth				
Chiang Mai	65.3	-0.21	-0.25	0.8
		(0.21)	(0.22)	
All others	70.0	R.C.	R.C.	
Residence when growing up				
Urban	68.1	0.02	0.12	1.1
		(0.28)	(0.31)	
Rural	67.6	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001. Note: R.C. is Reference Category.

In our Chiang Mai sample, 23.6 per cent of sexually active soldiers reported having had a sexually transmitted disease in the last six months. Ever having had sex with another male and age are significantly associated with having had a sexually transmitted disease in the past six months (Table 7). After adjusting for other variables, men who report having had sex with other men are 4.8 times more likely to have had a sexually transmitted disease in the past six months than are men who have not had sex with other men. Compared with 18-21 year old men, those who are 22-24 years old are twice as likely to have had a sexually transmitted disease in the past six months.

Table 7
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of having a sexually transmitted disease in the last six months, sexually active Northern Thai male soldiers (N=399), Setember-October 1991

Had sexually transmitted disease in last six months				
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	50.8	1.53***	1.56***	4.8
		(0.29)	(0.30)	
No	18.3	R.C.	R.C.	
Age				
22-24 years	29.6	0.74**	0.71**	2.0
		(0.25)	(0.26)	
18-21 years	16.7	R.C.	R.C.	
Education				
More than six years	22.5	-0.12	-0.25	0.8
		(0.24)	(0.27)	

Six years or less	24.5	R.C.	R.C.	
Province of birth				
Chiang Mai	25.5	0.21	0.18	1.2
		(0.24)	(0.25)	
All others	21.7	R.C.	R.C.	
Residence when growing up				
Urban	23.2	-0.03	-0.21	0.8
		(0.31)	(0.36)	
Rural	23.6	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001

As discussed above, men who have sex with other men in our sample are more likely to have had sex with a female prostitute in the six months before the survey than are men who have sex with women only. This finding, in conjunction with results reported by Beyrer et al. (1995), suggests that the observed association between same-sex sexual behaviour and the likelihood of acquiring a sexually transmitted disease may be due to more frequent contact with female prostitutes among men who have sex with men. However, a supplemental analysis (not shown) indicates that this is not the case in our data. We re-estimated the model presented in Table 7, controlling for having been to a female prostitute in the past six months. Having been to a female prostitute (beta = 2.21, SE = 0.45, $p < 0.0001$) and ever having had sex with a man (beta = 1.48, SE = 0.32, $p < 0.0001$) were independently associated with having had a sexually transmitted disease in the past six months. It remains unclear how patterns of partnering with male prostitutes and sexual partners who are not involved in prostitution influence the likelihood of sexually transmitted disease acquisition in this population.

Men who have sex with other men and HIV/AIDS-related knowledge

Numerous studies of HIV/AIDS knowledge in Thailand have been reported in the literature (Swaddiwudhipong et al. 1990; Shah et al. 1991; Maticka-Tyndale et al. 1994; VanLandingham et al., 1997).[18] One study documented substantial HIV/AIDS knowledge deficits among men who have sex with other men (Sittitrai et al. 1993). Although we measure HIV/AIDS knowledge in 1991, and knowledge levels may have changed substantially since then in this population, we believe this analysis contributes a useful baseline against which more current data might be compared.

Table 8 presents descriptive statistics and the results of an ordinary least squares regression analysis of correlates of HIV/AIDS-related knowledge. An HIV/AIDS knowledge scale was constructed using 18 items from the questionnaire (see Appendix B). Cronbach's alpha for the knowledge scale is 0.72. The knowledge scale was regressed on a set of dummy variables measuring ever having had sex with another male, the four socio-demographic variables described above, and the four HIV/AIDS-relevant outcomes considered previously.

On average, respondents correctly answered 11 of the 18 questions (standard deviation = 3.4). At the bivariate level, HIV/AIDS-related knowledge is significantly lower among men who have ever had sex with other men, men who have ever used intravenous drugs, men who personally know someone with HIV/AIDS, men who have had sex with a female prostitute in the past six months, and men who have had a sexually transmitted disease in the past six

---

[18] For overviews of AIDS education campaigns in Thailand, see Ford and Koetsawang (1991) and Lyttleton (1994). For a news report on how the Thai government restricted the scope of its AIDS education efforts in 1992, see Clements (1992).

months. HIV/AIDS-related knowledge is significantly higher among men with more than six years of education.

After adjusting for the socio-demographic variables only (Model 1), the strength of the association between men who have ever had sex with other men and HIV/AIDS-related knowledge increases slightly and remains significant. Inclusion of the four other HIV/AIDS-related variables reduces the strength of the association substantially (Model 2), although it remains marginally significant ($p < 0.06$). In Model 2, HIV/AIDS knowledge is also associated independently with education, knowing someone with HIV/AIDS, and having had a sexually transmitted disease in the past six months. Overall, Model 2 explains 13.5 per cent of the variance in HIV/AIDS knowledge scale scores.

Discussion

We focus on men who have sex with men in Thailand in order to broaden our understanding of an under-studied group that appears to be at substantial risk for HIV infection. Overall, we find that 16.3 per cent of our soldier sample ever had anal or oral sex with another male. Comparison of this estimate with estimates derived from two other samples of northern Thai military recruits drawn in 1991 (Nopkesorn et al. 1993; Nelson et al. 1993) indicates that same-sex sexual behaviour may be far more common among Thai men than was previously believed. The lower rates observed by Nopkesorn et al. (1993) and Nelson et al. (1993) appear to be related to the use of a more restrictive definition of same-sex sexual behaviour in one study, and the use of more invasive data collection methodologies in both studies. Empirical experimental investigations of the effect of the interview administration method would be the ideal approach for clarifying the extent of problems associated with face-to-face interviews regarding sensitive and stigmatized behaviour in Thailand. In the absence of such data, our analysis strongly suggests that future studies should employ anonymous, self-administered questionnaires to gather data on sexual behaviour and other stigmatized behaviours whenever possible.

Table 8

Ordinary least squares regression analysis of correlates of HIV/AIDS knowledge, sexually active Northern Thai male soldiers (N=399), September-October 1991

AIDS knowledge scale (range 0-18; high knowledge =18)				
Independent variable	Group mean	Unadjusted beta (standard error)	Model 1 Adjusted beta (standard error)	Model 2 Adjusted beta (standard error)
Ever had sex with male				
Yes	10.0	-1.26**	-1.46**	-0.51#
		(0.46)	(0.46)	*0.48)
No	11.2	R.C.	R.C.	R.C.
Age				
22-24 years	11.1	0.11	0.16	0.45
		(0.34)	(0.33)	(0.33)
18-21 years	11.0	R.C.	R.C.	R.C.
Education				
More than six years	11.7	1.36***	1.48***	1.61***
		(0.33)	(0.35)	(0.35)
Six years or less	10.4	R.C.	R.C.	R.C.

Province of birth				
Chiang Mai	10.9	-0.21	-0.09	-0.11
		(0.34)	(0.46)	(0.32)
All others	11.1	R.C.	R.C.	R.C.
Residence when growing up				
Urban	11.3	0.30	-0.14	-0.01
		(0.45)	(0.33)	(0.45)
Rural	11.0	R.C.	R.C.	R.C.
Ever use IV drugs				
Yes	9.0	-2.19**		-1.46
		(0.76)		(0.76)
No	11.1	R.C.		R.C.
Know someone with HIV/AIDS				
Yes	9.9	-1.31*		-1.54**
		(0.56)		(0.56)
No	11.2	R.C.		R.C.

Table 8 continued

Sex with prostitute in past 6 months			
Yes	10.7	-0.92* (0.36)	-0.29 (0.37)
No	11.7	R.C.	R.C.
Had STD in last 6 months			
Yes	9.6	-1.90*** (0.39)	-1.49*** (0.42)
No	11.5	R.C.	R.C.

Significance levels: #=p ó 0.06; *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001

The studies by Nelson et al. (1993) and Nopkesorn et al. (1993) were seroprevalence studies in which blood samples were drawn for HIV-antibody testing. We are aware that our recommendation would make it more difficult to link survey data with blood tests; however, through *a priori* labelling of blood collection vials and questionnaires with unique codes, it is possible to collect data anonymously in these kinds of studies. As has been noted in policy debates regarding blinded (anonymous) versus un-blinded (confidential) testing of all newborns in the United States and elsewhere, the disadvantage of anonymous data collection in seroprevalence studies is that persons who test positive cannot be informed for the purposes of medical treatment or prophylaxis. The ethical and policy issues related to the question of whether it is ever appropriate to collect blinded seroprevalence data have not been fully resolved at this time. These trade-offs must be kept in mind when designing future studies that obtain blood samples for HIV-antibody testing and collect data on stigmatized behaviour; however, when no blood collection is involved, our results strongly suggest that estimates of sensitive behaviour will be seriously biased if confidential, rather than anonymous, instruments are used.

Examination of socio-demographic correlates of same-sex sexual behaviour reveals a pattern of associations indicative of a positive association between higher socio-economic status and same-sex sexual behaviour among Thai soldiers. To the best of our knowledge, this is the first study to investigate socio-demographic variation in same-sex sexual behaviour in Thailand. Further investigation of the influence of socio-economic status and other social context variables on the initiation and maintenance of same-sex sexual behaviour is warranted. Future research should investigate these and other issues related to sexual behaviour in contexts other than the military. Studying military recruits is advantageous because it is a relatively easy population to locate and includes a broad spectrum of Thai men. However, there are a number of reasons to be cautious about generalizing findings from military recruits to the broader Thai male population. First, many men from privileged backgrounds can opt out of military service. Second, there may be special circumstances associated with military life that are conducive to same-sex sexual behaviour. The most obvious feature is the absence of women in the camps, although bases typically have brothels nearby that the men can patronize while on leave. Ethnographic studies would be extremely valuable for obtaining more contextualized understandings of the social organization of same-sex sexual behaviour in various segments of Thai society.

More detailed specification of patterns of same-sex sexual behaviour is another important direction for future research; this would broaden our understanding of Thai male sexual behaviour and contribute to our understanding of HIV risk in this population. It is interesting to note that Nopkesorn et al. (1993) find that none of the 46 men who reported receptive anal intercourse was HIV-antibody positive, while eight of the 80 men who reported insertive anal intercourse were seropositive. If preferences for sexual roles are relatively stable in Thailand, those who usually engage in insertive anal intercourse with another male may be at greater risk for HIV infection because they may be more likely to visit female prostitutes than are those who usually engage in receptive intercourse. Further specification of the sexual behaviour patterns of men who have sex with other men may have significant implications for HIV prevention policy and program development.

We find that men who have ever had sex with other men are significantly more likely to have ever injected drugs, to personally know someone with HIV/AIDS, to have had sex with a female prostitute in the last six months, and to have had a sexually transmitted disease in the last six months. At the bivariate level and with socio-demographic controls in the model, men who have had sex with other men had significantly lower HIV/AIDS knowledge scale scores than did men who have not had sex with other men. This effect became marginally significant when controls for the other HIV/AIDS-related outcomes were introduced into the model. These results suggest that men who have sex with other men in Thailand are at substantial risk for HIV infection through both sexual and drug use behaviour, and that they have substantial knowledge deficits. Taken together, our findings indicate the need for targeted efforts to reach subgroups within the population of men who have sex with other men, in order to provide these men with HIV/AIDS prevention and treatment information.

Social desirability bias may partly account for the associations we observe between same-sex sexual behaviour and these other HIV-related outcomes. Persons who are more willing to report truthfully about same-sex sexual behaviour may also be more willing to report other illegal, stigmatized, or deviant behaviours. While we believe it is important to consider the influence of social desirability bias, we also believe it is important not to overstate its potential to account for our results. The data in our study were collected by means of an anonymous, self-administered questionnaire. This mode of data collection removes the key influences on social desirability bias: an interviewer and a means to identify the respondent. Thus, the incentive to underreport illegal, stigmatized, and deviant activity is reduced for all respondents in our study, not just for those who have engaged in same-sex sexual behaviour.

Although HIV seroprevalence appears to be relatively low among men who have sex with other men in Thailand (Weniger et al. 1991; Nelson et al. 1993; Nopkesorn et al. 1993; Sittitrai et al. 1993), the results reported in this paper suggest that there is great potential for the rapid spread of HIV in this population. Additionally, given that all of the men who report having sex with other men also report having sexual contact with women, a rapid increase in the incidence of HIV infection among men who have sex with other men has the potential to bridge the epidemic between other populations and social networks or to contribute to already expanding epidemics. For the purposes of both primary prevention of HIV infection among men who have sex with other men and secondary prevention with respect to their male and female sexual partners, it is important that additional research be conducted for the purposes of obtaining a better understanding of the social organization of sexual activity among men who have sex with other men.

The epidemiological significance of bisexuality in Thailand is different from that in more developed countries. In more developed countries with a high prevalence of HIV among men who have sex with other men, there is concern that bisexual males may serve as a bridge to spread HIV to low-prevalence female populations. In Thailand, available evidence suggests that HIV prevalence is still relatively low among men who have sex with other men. Concern about bisexuality must be focused on preventing the spread of HIV from high-prevalence populations of female and male prostitutes, their clients, and intravenous drug users, to men who have sex with other men, as well as from these men to other female and male subpopulations. It may still be possible in Thailand to prevent an explosive epidemic of HIV infection transmitted through social networks of men who have sex with other men; this must be considered a public health priority.

References

Abramson, Paul. 1992. Sex, lies, and ethnography. Pp. 101-123 in *The Time of AIDS*, edited by G. Herdt and S. Lindenbaum. Newbury Park: Sage.

Bamber, S. D., K. J. Hewison and P. J. Underwood. 1993. A history of sexually transmitted diseases in Thailand: policy and politics. *Genitourinary Medicine* 69:148-157.

Beyrer, Chris, Sakol Eiumtrakul, David D. Celentano, Kenrad E. Nelson, Somsri Ruckphaopunt, and Chirasak Khamboonruang. 1995. Same-sex behavior, sexually transmitted diseases and HIV risks among young northern Thai men. *AIDS* 9:171-176.

Billy, John O., Koray Tanfer, William R. Grady and Daniel H. Klepenger. 1993a. The sexual behavior of men in the United States. *Family Planning Perspectives* 25:52-60.

Billy, John O., Koray Tanfer, William R. Grady and Daniel H. Klepenger. 1993b. Estimating the prevalence of homosexual behavior: the author's reply to Stokes and McKirnan. *Family Planning Perspectives* 25:185-186.

Brown, Tim, Werasit Sittitrai, Suphak Vanichseni and Usa Thisyakorn. 1994. The recent epidemiology of HIV and AIDS in Thailand. *AIDS* 8 (Suppl. 2):S131-S141.

Choopanya, Kachit, Suphak Vanichseni, Don C. Des Jarlais, Kanokporn Plangsringarm, Wandee Sonchai, Manuel Carballo, Patricia Friedmann and Samuel R. Friedman. 1991. Risk factors and HIV seropositivity among injecting drug users in Bangkok. *AIDS* 5:1509-1513.

Clements, Alison. 1992. Thailand stifles AIDS campaign. *British Medical Journal* 304:1264.

Deemar Corporation. 1990. *Presentations of Findings. Knowledge, Attitudes, and Practices. Study on AIDS in Urban Thailand*. Bangkok.

Des Jarlais, Don C., Kachit Choopanya, Suphak Vanichseni, Kanokporn Plangsringarm, Wandee Sonchai, Manuel Carballo, Patricia Friedmann and Samuel R. Friedman. 1994. AIDS risk reduction and reduced HIV seroconversion among injection drug users in Bangkok. *American Journal of Public Health* 84:452-455.

Des Jarlais, Don C., Samuel R. Friedman, Kachit Choopanya, Suphak Vanichseni and Thomas P. Ward. 1992. International epidemiology of HIV and AIDS among injecting drug users. *AIDS* 6:1053-1068.

Erlanger, Steven. 1991. A plague awaits. *New York Times Magazine* 14 July :24-26,49,53.

Fay, R. E., Charles F. Turner, A. D. Klassen and John H. Gagnon. 1989. Prevalence and patterns of same-gender contact among men. *Science* 243:338-348.

Ford, Nicholas and Suporn Koetsawang. 1991. The socio-cultural context of the transmission of HIV in Thailand. *Social Science and Medicine* 33:405-414.

Hanenberg, Robert, Wiwat Rojanapithayokorn, Prayura Kunasol and David C. Sokal. 1994. Impact of Thailand's HIV-control programme as indicated by the decline of sexually transmitted diseases. *Lancet* 344:243-245.

Jackson, Peter A. 1989. *Male Homosexuality in Thailand - An Interpretation of Contemporary Thai Sources*. New York: Global Academic Publishers.

Jackson, Peter A. 1993. From Kamma to unnatural vice: Thai Buddhist accounts of male homosexuality and AIDS. Paper presented at the International Thai Studies Conference, School of Oriental and African Studies, University of London, July.

Keyes, C. F. 1989. *Thailand: Buddhist Kingdom as Modern Nation-State*. Boulder: Westview Press.

Kinsey, Alfred C., Wardell P. Pomeroy and Clyde E. Martin. 1948. *Sexual Behavior in the Human Male*. Philadelphia: W.B. Saunders Company.

Klausner, W. J. 1987. Sex and morality in a northeastern Thai village: ideal and practice. Pp. 93-98 in *Reflections on Thai Culture: Collected Writings of William J. Klausner*. Article originally published in 1972. Bangkok: Siam Society.

Kunawararak, Piyada, Chris Beyrer, Chawalit Natpratan, Waldo Feng, David D. Celentano, Melanie de Boer, Kenrad E. Nelson and Chirasak Khamboonruang. 1995. The epidemiology of HIV and syphilis among male commercial sex workers in northern Thailand. *AIDS* 9:517-521.

Lancet. 1994. AIDS: the third wave. 343:186-188.

Laumann, Edward O., John H. Gagnon, Stuart Michaels, Robert T. Michael and L. Philip Schumm. 1993. Monitoring AIDS and other rare population events: a network approach. *Journal of Health and Social Behavior* 34:7-22.

Laumann, Edward O., John H. Gagnon, Robert T. Michael, and Stuart Michaels. 1994. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago: University of Chicago Press.

Limsuwan, A., S. Kanapa and Y. Siristonapun. 1986. Acquired Immune Deficiency Syndrome in Thailand: a report of two cases. *Journal of the Medical Association of Thailand* 69:164-169.

Lyttleton, Chris. 1994. Knowledge and meaning: the AIDS education campaign in rural northeast Thailand. *Social Science and Medicine* 38:135-146.

Mann, Jonathan, Daniel J. M. Tarantola and Thomas W. Netter (eds). 1992. *AIDS in the World*. Cambridge MA: Harvard University Press.

Mastro, Timothy D., Dwip Kitayaporn, Bruce G. Weniger, et al. 1994. Estimating the number of HIV-infected injection drug users in Bangkok: a capture-recapture method. *American Journal of Public Health* 84:1094-1099.

Maticka-Tyndale, Eleanor, Monthira Kiewying, Melissa Haswell-Elkins, et al. 1994. Knowledge, attitudes and beliefs about HIV/AIDS among women in northeastern Thailand. *AIDS Education and Prevention* 6:205-218.

Muecke, Marjorie A. 1990. The AIDS prevention dilemma in Thailand. *Asian and Pacific Population Forum* 4:2-27.

Muecke, Marjorie A. 1992. Mother sold food, daughter sells her body: the cultural continuity of prostitution. *Social Science and Medicine* 35:891-901.

Napaporn, Havanon, Anthony Bennett and John Knodel. 1993. Sexual networking in provincial Thailand. *Studies in Family Planning* 24:1-17.

Nelson, Kenrad E., David D. Celentano, Somboon Suprasert, et al. 1993. Risk factors for HIV infection among young adult men in northern Thailand. *Journal of the American Medical Association* 270:955-960.

Nopkesorn, Taweesak, Suebpong Sungkorom and Rungkan Sornlum. 1991. *HIV Prevalence and Sexual Behaviors among Thai Men Aged 21 in Northern Thailand: Research Report No. 3.* Bangkok: Thai Red Cross Society.

Nopkesorn, Taweesak, Timothy D. Mastro, Suebpong Sangkharomya, Mike Sweat, Pricha Singharaj, Khanchit Limpakarnjanarat, Helene D. Gayle and Bruce G. Weniger. 1993. HIV-1 infection in young men in northern Thailand. *AIDS* 7:1233-1239.

Phanuphak, Praphan, C. Locharernkul, W. Panmuong and H. Wilde. 1985. A report of three cases of AIDS in Thailand. *Asian Pacific Journal of Allergy and Immunology* 3:195-199.

Phongpaichit, Pasuk. 1982. *From Peasant Girls to Bangkok Masseuses*. Geneva: International Labour Organization.

Pokapanichwong, Waranee, Don Douglas, Nicholas H. Wright, Suphak Vanichseni and Kachit Choopanya. 1991. AIDS beliefs and behaviors among intravenous drug users in Bangkok. *International Journal of the Addictions* 26:1333-1347.

Pongthai, Sompol. 1990a. Sexual experience and sexual orientation among Ramathibodi medical students, Thailand. *Journal of the Medical Association of Thailand* 73 (Suppl. 1):81-86.

Pongthai, Sompol. 1990b. Sexual outlets among homosexually oriented medical students as compared to heterosexuals. *Journal of the Medical Association of Thailand* 73 (Suppl. 1):87-92.

Poshyachinda, Vichai. 1993. Drugs and AIDS in Southeast-Asia. *Forensic Science International* 62:15-28.

Prasartkul, Pramote, Apichat Chamratrithirong, Anthony Bennett, Ladda Jitwatanapataya and Pimonpam Isarabhakdi. 1987. Rural adolescent sexuality and the determinants of provincial urban premarital adolescent sex. IPSR Publication 113. Bangkok: Mahidol University.

Rogers, Susan M. and Charles F. Turner. 1991. Male-male sexual contact in the USA: findings from five sample surveys, 1970-1990. *Journal of Sex Research* 28:491-519.

Shah, I., Varachi Thongthai, Boonlert Leoprapai, Axel Mundigo, Pramote Prasartkul and Ampichat Chamratrithirong. 1991. Knowledge and perceptions about AIDS among married women in Bangkok. *Social Science and Medicine* 33:1287-1293.

Sittitrai, Werasit. 1990. Outreach to bar workers in Bangkok. *Hygie* 9:25-28.

Sittitrai, Werasit, Tim Brown and C. Sakondhavat. 1993. Levels of HIV risk behavior and AIDS knowledge in Thai men having sex with other men. *AIDS Care* 5:261-271.

Sittitrai, Werasit, Praphan Phanuphak, Jean Barry and Tim Brown. 1992. *Thai Sexual Behaviour and Risk of HIV Infection - A Report on the 1990 Survey of Partner Relations and Risk of HIV Infection*. Bangkok: Thai Red Cross Society.

Stokes, Joseph P. and David J. McKirnan. 1993. Estimating the prevalence of homosexual behavior. *Family Planning Perspectives* 25:184-185.

Suwangool, Surapol, Areerat Sonjai, Somsak Seriapinan, Kritsana Janyapoon and Aphichat Sivayathorn. 1992. HIV infection in male patients attending a sexually transmitted disease clinic. *Journal of the Medical Association of Thailand* 75:293-298.

Swaddiwudhipong, Witaya, Patchree Nguntra, Ploenjai Lerdlukanavonge, Chaveewan Chaovakiratipong and Supawan Koonchote. 1990. A survey of knowledge about AIDS and sexual behavior in sexually active men in Mae Sot Tak, Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health* 21:447-452.

Tanfer, Koray. 1993. National Survey of Men: design and execution. *Family Planning Perspectives* 25:83-86.

Thanprasertsuk, Sombat and Taweesap Siraprapasiri. 1991. Probability of HIV acquisition from HIV-exposed sex service among prostitutes, Chiang Mai, Thailand, June-August 1989. *Thai AIDS Journal* 3:45-53.

Traisupa, A., W. Chainarong and D. N. Taylor. 1987. AIDS and prevalence of antibody to Human Immunodeficiency Virus (HIV) in high risk groups in Thailand. *Genitourinary Medicine* 63:106-108.

Truong, Thanh-dam. 1990. *Sex, Money, and Morality: Prostitution and Tourism in Southeast Asia*. London: Zed Books.

United Nations. 1995. *World Population Prospects: 1994 Revision*. New York.

Vanichseni, Suphak, Kachit Choopanya, Don C. Des Jarlais, Kanokporn Plangsringarm, Wandee Sonchai, Manuel Carballo, Patricia Friedmann and Samuel R. Friedman. 1992. HIV testing and sexual behavior among intravenous drug users in Bangkok, Thailand. *Journal of Acquired Immune Deficiency Syndromes* 5:1,119-1,123.

Vanichseni, Suphak, Don C. Des Jarlais, Kachit Choopanya, et al. 1993. Condom use with primary partners among injecting drug users in Bangkok, Thailand and New York City, United States. *AIDS* 7:887-891.

Vanichseni, Suphak, Kanokporn Plansringarm, Wandee Sonchai, P. Akarasewi, N.H. Wright and Kachit Choopanya. 1989. Prevalence rate of primary HIV infection among drug users in narcotics clinic and rehabilitation centers of the Bangkok Metropolitan Administration in 1989. *Thai AIDS Journal* 1:75-82.

Vanichseni, Suphak, Busakorn Wongsuwan, Staff of BMA Narcotics Clinic No. 6, Kachit Choopanya, and Kowit Wongpanich. 1991. A controlled trial of methadone maintenance in a population of intravenous drug users in Bangkok: implications for the prevention of HIV. *International Journal of the Addictions* 26:1313-1320.

VanLandingham, Mark J. 1993. Two perspectives on risky sexual practices among Northern Thai males: the health belief model and the theory of reasoned action. Ph.D. dissertation, Princeton University, Princeton.

VanLandingham, Mark J., Nancy Grandjean, Somboon Suprasert and Werasit Sittitrai. 1997. Dimensions of AIDS knowledge and risky sexual practices: a study of northern Thai males. *Archives of Sexual Behavior* 26(3).

VanLandingham, Mark J., John Knodel, Chanpen Saengtienchai and Anthony Pramualratana. 1994. Aren't sexual issues supposed to be sensitive? *Health Transition Review* 4:85-90.

VanLandingham, Mark J., Somboon Suprasert, Nancy Grandjean and Werasit Sittitrai. 1995. Two views of risky sexual practices among northern Thai males: the Health Belief Model and the Theory of Reasoned Action. *Journal of Health and Social Behavior* 36:195-212.

VanLandingham, Mark J., Somboon Suprasert, Werasit Sittitrai, Chayan Vaddhanaphuti and Nancy Grandjean. 1993. Sexual activity among never-married men in northern Thailand. *Demography* 30:297-313.

Weller, Susan C. 1993. A meta-analysis of condom effectiveness in reducing sexually transmitted HIV. *Social Science and Medicine* 36,12:1,635-644.

Wellings, Kaye, Julia Field, Anne Johnson and Jane Wadsworth. 1994. *Sexual Behavior in Britain: The National Survey of Sexual Attitudes and Lifestyles*. New York: Penguin.

Weniger, Bruce G., Khanchit Limpakarnjanarat, Kumnuan Ungchusak, et al. 1991. The epidemiology of HIV infection and AIDS in Thailand. *AIDS* 5, Suppl. 2:S71-S85.

Appendix A

This appendix presents the 18 items used for constructing the HIV/AIDS knowledge scale, the choices that were considered by us to represent accurate responses, and the percentage responding accurately, i.e., in a way that suggests high rather than low level of knowledge about HIV/AIDS. Percentages are based on the full sample with complete socio-demographic and sexual behaviour data, including the sexually inexperienced (N=430). Missing responses for a given item were coded as inaccurate responses for that item.

Knowledge scale items	Accurate response	Per cent accurate
Have you heard of AIDS?	Yes	97.0
Are the following statements correct or not?		
A person can be infected with the AIDS virus and not have symptoms of the disease.	Definitely or probably true	68.0
There are drugs available to treat AIDS that can lengthen the life of an infected person.	Definitely or probably true	44.7
There is a drug available to the public that protects a person from contracting AIDS.	Definitely or probably false	45.8
There is no treatment/cure/recovery for AIDS at present.	Definitely or probably true	71.4
How likely do you think it is that a person will contract the AIDS virus from….		
Working near someone with the AIDS virus?	Definitely or probably not possible	48.6
Sharing needles for drug use with someone who has the AIDS virus?	Great possibility or could be possible	88.8
Attending school with students who have the AIDS virus?	Definitely or probably not possible	72.6
Mosquitoes or other insect?	Definitely or probably not possible	64.2
Sharing a comb with an infected person?	Definitely or probably not possible	58.1
How effective would you say the following are in reducing the chances of contracting the AIDS virus?		
Not having sexual intercourse.	Very effective	55.8

Appendix A continued

Using condoms during sexual intercourse.	Very effective	54.7
Urinating after sexual intercourse.	Not effective	19.8
Having sexual intercourse with only one person who is not infected with the AIDS virus.	Very effective	54.0
Please indicate whether you agree or disagree with the following statement.		
I can tell by looking at a female prostitute whether she has the AIDS virus or not.	Strongly disagree or disagree	47.2
It is safe to have sex with female prostitutes without using condoms if one goes only to the clean and disease-free brothels.	Strongly disagree or disagree	62.1
It is safe to have sex with female prostitutes without using condoms if one goes only to high-class prostitutes in the expensive brothels.	Strongly disagree or disagree	75.6
It is safe to have sex with female prostitutes without using condoms if one goes only to brothels where only Thai men go (and not foreigners).	Strongly disagree or disagree	74.7

Appendix B

Correlation Matrix (Sexually Active Soldiers Only / N=399).

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Age 22 or more years	1.00									
2. >6 years education	0.02	1.00								
3. Chiang Mai Province	-0.01	-0.02	1.00							
4. Urban residence	0.02	0.30***	0.00	1.00						
5. Ever sex with male	0.07	0.10*	0.04	0.14**	1.00					
6. Ever inject drugs	0.04	0.09	0.02	0.16**	0.29***	1.00				
7. Know person with HIV	0.08	0.24***	0.01	0.11*	0.19***	0.15**	1.00			
8. Prostitute last 6 months	0.19***	-0.09	-0.05	0.00	0.10*	0.04	0.09	1.00		
9. STD last 6 months	0.15**	-0.02	0.05	0.00	0.28***	0.19***	0.07	0.31***	1.00	
10.HIV/AIDS knowledge	0.02	0.20***	-0.03	0.03	-0.14**	-0.14**	-0.12*	-0.13*	-0.24***	1.00
Mean	0.53	0.47	0.49	0.17	0.16	0.05	0.10	0.68	0.24	11.15
Standard deviation	0.50	0.50	0.50	0.38	0.37	0.22	0.30	0.47	0.42	3.39

* p ó 0.05
** p ó 0.01
*** p ó 0.001

Health Transition Review 7, 1997, 61-71

Rationalizing health care in a changing world: the need to know *

Kenneth S. Warren

The Picower Institute for Medical Research, 300 Community Dr., Manhattan NY 11030

Abstract

The World Development Report 1993 announced that global life expectancy was then 65. Experience in the developed world suggests that the World Health Organization’s dictum, ‘health is a state of complete physical, mental and social well-being’, is simply not attainable for the foreseeable future. As physical health has improved, mental problems have become more prominent and a sense of well-being has declined. Furthermore, as the population ages and medical technology improves, the cost of health care grows almost exponentially. Since the population of the developed world is continuing to age and aging is spreading rapidly throughout the developing world, knowledge is the principal way of dealing with this seemingly intractable problem: we must know, quantitatively, the age-specific causes of ill health, and we must know which means of prevention and treatment are effective. Finally, we must apply that knowledge rationally

The first childhood of humankind essentially began when primates descended from the trees millions of years ago; it lasted until about the end of the nineteenth century when life expectancy began to rise in the Western world. It began to accelerate only about 50 years ago and touched the developing world only in the last 30 years. Richard Peto found that half the population was dead before the age of 40 in the pre-agricultural Palaeolithic and agricultural Neolithic periods, in a Roman colony in North Africa, in old rural Britain (pre-industrial revolution) and in tropical Africa only a short time ago (R. Peto, personal communication). A Rockefeller Foundation meeting in 1985 called *Good Health at Low Cost* made us aware that three of the poorest areas in the world, China, Sri Lanka, and India's Kerala State, had verifiable life expectancies of 65 (Halstead, Walsh and Warren 1985). In 1988 at a conference in Bellagio, Caldwell gave this ubiquitous aging process both a name, the ‘health transition’, and a formula encompassing the demographic transition with its decrease in infectious disease mortality and decline in fertility, and the epidemiological transition with its aging population and increase in chronic non-communicable diseases.

In 1993 the *World Development Report: Investing in Health* trumpeted the startling statistic that global life expectancy had achieved 65: China's had leapt to 69, Sri Lanka's to 71

---

*This address was given at the Australian National University, Canberra, in August 1996. It was incompletely reported in the Supplement to Volume 6 of the *Health Transition Review*, 1996, and is reproduced here in full. John C. Caldwell.

and the composite figure for all of Latin America and the Caribbean had reached 70. In China the communicable, non-communicable and injury related deaths were respectively 13, 77 and 10 per cent, and in India 35, 57 and 8 per cent. In the last 50 years humankind in the aggregate has undergone a startling transition from a child-based to an aging population rapidly moving towards its second childhood.

These massive transformations, due to a combination of social, political, economic and medical changes, have resulted in a population explosion which, in turn, is having major environmental effects. Moreover, the economies of the developed world of the North are being threatened by the high cost of health care delivery, while those of the developing world of the South cannot even begin to afford the profligate health care systems and technologies adopted by the governments of the North. Paradoxically, the World Health Organization's famous dictum that 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity', is proving to be a more and more tenuous goal. As physical well-being has increased in Europe and North America, mental illness has become more prominent. In fact 'mental illness and handicap' was the most prevalent condition, based on morbidity indicators as well as mortality rates, in Black and Pole's (1975) pioneering study of the relative burden of disease in the United Kingdom. As social well-being has improved, both within and among nations, the disparity between wealth and poverty has become more pronounced. For instance, life expectancy at birth in the poverty-stricken areas of many inner cities in the United States is comparable to that of parts of Africa (McCord and Freeman 1990). Finally, as people live longer and healthier lives they become more disgruntled with medicine and health care, as described:

> Although the collective health of the nation [USA] has improved dramatically in the past 30 years, surveys reveal declining satisfaction with personal health during the same period. Increasingly, respondents report greater numbers of disturbing somatic symptoms, more disability, and more feelings of general illness (Barsky 1988).

A key necessity in dealing with these complex matters is the gathering of valid data on factors as crucial as the age-specific prevalence of the diseases occurring in the areas of concern, and the relative efficacy of the interventions used to diagnose, treat and prevent them. Strategies for maintaining health and ameliorating disease must be based on knowledge; 'need to know' is an essential part of the process. During this century many conflicting health concepts and strategies have been advocated. These were often based on erroneous scientific, epidemiologic, demographic or economic data. Moreover, many national, regional and even global projects were launched on the basis of these ideas, but, for the most part, their outcomes were disappointing.

Concepts and crusades

From the beginning of the twentieth century there have been conflicting concepts on the diseases responsible for morbidity and mortality, their relative quantity and importance, and how to treat and prevent them. Withal there has been a constantly changing playing field as the disease spectrum has altered with socio-economic development. This began before the turn of the century in Europe and the United States. Only in the last few decades has it spread, at an unprecedentedly rapid rate, throughout the rest of the world. The fundamental change has been from high infant and child mortality rates due largely to infectious agents, to the chronic diseases of aging.

Over this span of more than 100 years there has been enormous controversy about what was going on, and on how to deal with those problems deemed to be of importance. During this age of metamorphosis academicians and bureaucrats were either unaware of it, ignored it, or vied with each other over the causes or the means of coping with it. As is usual in such situations, those involved were virtually all limited by their own professional points of view: biomedical, public health, agricultural, political, demographic, economic, sociological, even religious. The fundamental reality, however, was that almost all of them were right to a certain degree, but, unfortunately, most of them believed that their particular concept was the predominant or only one.

At the beginning of the twentieth century, when the colonial powers were concerned with the high mortality of their soldiers and administrators in the tropics, a major controversy erupted over whether the answer to the high death rate in young and healthy individuals lay in biomedical research or public health application (Warren 1990). In 1898, Manson, the 'father of tropical medicine', stated:

> I now firmly believe in the possibility of tropical colonization by the white races. Heat and moisture are not in themselves the direct causes of any important tropical disease. The direct causes of 99% of these diseases are germs. To kill them is simply a matter of knowledge (Manson 1898).

His student, discoverer of the means of transmission of malaria, and great adversary, Ross believed passionately that the main determinants of health were 'general living conditions, diet and sanitation.' Three decades later Ross conceded the battle:

> I must say that I was rather disappointed with Manson's attitude towards the whole subject of prevention. He never seemed very keen on it and was chiefly interested in the parasitological side of the subject while I was interested more in the practical side ... The British Empire has generally followed his example during the last thirty years (Ross 1928).

At that time, the 1920s, the Rockefeller Foundation had begun its crusade to eradicate hookworm by a combination of chemotherapy, sanitation and education in '52 countries, 6 continents and 29 islands of the seas' . This was soon followed by a campaign led by Gorgas to eradicate yellow fever from its reservoirs in Latin America and Africa by mosquito control. But the greatest battle of them all was the World Health Organization's campaign from 1955 to 1970 to end transmission by a campaign in a short space of time that would eliminate the 'reservoir' of infected cases. Unfortunately, none of these magnificent initiatives achieved their ultimate goal, leading to general disillusionment with targeted campaigns driven by science and technology.

Thus, it was not surprising when Professor of Social Medicine, McKeown (1976), proclaimed, on the basis of his studies of changes in mortality in England and Wales from 1838 to 1970 that 'Medical measures of immunization and treatment were relatively ineffective; they were also unnecessary' (McKeown 1976). This point of view was reinforced by a working paper commissioned by the Rockefeller Foundation for a conference on Health and Population in Development (Grosse 1980). Using data gathered in Indonesia, this document reported multiple regression comparisons of life expectancy and infant mortality rates with a multiplicity of health, economic and social indicators. Its primary conclusion was that 'health inputs and sanitation facilities were less able to explain variations in levels of life expectancy than were social factors' (Grosse 1980), one being the availability of transistor radios.

Grosse's use of monolithic figures such as life expectancy in his working paper led to concern that, being composites of numerous diseases and other health-related factors, they do not permit a clear grasp of the issues or enable the development of specific strategies to control them. This concern resulted in another paper that, for the first time, tried to elucidate the specific killers of infants and children in the developing world. It revealed that the major causes of mortality were diarrhoeas (5-10 million per annum), respiratory infections (4-5), malaria (1.2), and measles (0.9) followed by schistosomiasis, whooping cough, tuberculosis, neonatal tetanus, diphtheria and hookworm (Walsh and Warren 1979). This quantitative compendium of the specific medical causes of infant and child mortality immediately suggested that a few low-cost ‘technologies’ — immunization, oral rehydration therapy, breastfeeding and antimalarial prophylaxis — might rapidly decrease infant and child mortality (Walsh and Warren 1979).

Unfortunately, this targeted approach was perceived to conflict with a major new strategy which had just been adopted by the World Health Organization at a conference in Alma Ata (1978). The meeting reaffirmed WHO’s founding statement that ‘health is a state of complete physical, mental and social well-being’. It then agreed that the means of achieving this lofty goal was through primary health care, ‘which reflects and evolves from the economic conditions and socio-cultural and political characteristics of the country and its communities’ (WHO 1978). This broad approach included at least

> education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries;and provision of essential drugs (WHO 1978).

Several years later, however, UNICEF announced its Children’s Revolution which focused largely on four

> social and scientific advances [that] now offer vital new opportunities for improving the nutrition and health of the world’s children. For all four actions, the cost of the supplies and technology would be no more than a few dollars per child. Yet that could mean that literally hundreds of millions of young lives would be healthier. And within a decade, they could be saving the lives of 20,000 children each day. It is not the possibility of this kind of progress that is now in question. It is its priority (Grant 1983).

These four initiatives were oral rehydration therapy, universal child immunization, the promotion of breastfeeding, and growth charts (Grant 1983). When it appeared that this targeted ‘vertical’ approach called selective primary health care might be implemented, it was considered to be in conflict with the World Health Organization’s ‘horizontal,’ comprehensive primary health care strategy and was widely and strongly condemned. Banerji (1986) of New Delhi found ‘an ominous similarity between the spread of a highly malignant cancerous tumor and the promotion of the technocentric approach by western countries’ (p. 1233). Rifkin and Walt (1986) of London criticized an approach ‘based on medical and technological interventions’. They believed that

> radical health improvement will only come after a long period in which changes must occur on both levels of social, economic and political structures and on the level of individual and community perceptions (Rifkin and Walt 1986).

Over the last decade things have begun to shake out. Most important of all was the realization that no one approach or factor is responsible for the remarkable improvements in health statistics. A great moment came at a major international meeting in Talloires, France in 1988 when the Director General of WHO drew four vertical lines perpendicular to one horizontal line, and averred that the former enhanced the latter by providing ‘knowledge and motivation’. In one fell swoop, Mahler resolved the five-year controversy between selective and comprehensive primary health care. This illustrates what a fruitless and negative exercise it is to support one means of improving health at the expense of another. Nevertheless, polarization is still alive and well. A recent editorial in *The Lancet* (1995), ‘Fortress WHO: breaching the ramparts for health’s sake’, again takes a one-sided approach. Attention is called to the preamble to WHO’s constitution which

> recognizes the morality of global health interdependence, calls for individual, community, and national action, identifies societal factors as the main determinant of health status, and encourages work to ensure the fundamental conditions in which all people can achieve physical, mental, and social well-being.

There is no mention of biomedical research and medical interventions as possible determinants of the health of populations.

In order to rationalize health care and to make it affordable and universal whether in children or the old, whether in poor countries or rich countries, it is essential to know the specific problems we are facing. We need to base our actions on facts not opinions. If the facts are not available then we need to know that, and we must do our very best to find out what is going on. Given the vast variety of options, we need to know which interventions are effective and what they cost.

What is going on ?

'The intellectual free lunch,' a recent article by Kinsley (1995) in the *New Yorker* describes a University of Maryland opinion poll on foreign aid. It found that 75 per cent of Americans believe that the United States spends too much on foreign aid, and 64 per cent want it cut. When asked how big a share of the federal budget goes to foreign aid the average answer was 18 per cent. When asked the appropriate level of spending, the median answer was 5 per cent, and when asked how much would be too little the median answer was 3 per cent. The correct answer is less than 1 per cent. Kinsley noted that

> people are forming and expressing passionate views about foreign aid on the basis of no information at all. Or perhaps they think that the amount being spent on foreign aid is a matter of opinion, like everything else (Kinsley 1995).

He makes the reasonable suggestion that

> it is not asking too much to expect a citizen to recognize that he or she **needs to know** that number, at least roughly, in order to have a valid opinion about whether it is too large or too small (Kinsley 1995).

It is particularly disheartening that not only the general public, but 'experts' in biomedical research, public health, economics, even politics, are prepared to present their opinions on matters about which they have little or no factual knowledge. Even worse, governmental and international agencies often develop policies based on little or no knowledge. This is compounded by the fact that the data-starved developing world is virtually bereft of up-to-date information.

In order to develop rational and cost-effective strategies for health care it is important to know why people are getting sick, and the best way of doing this is by studying the age-specific causes of mortality. Beginning with infants and children under five years of age, it was believed, since the turn of the century, that protozoan and helminth parasites were the most important causes of disease during childhood in the developing world. Moreover, malnutrition was considered to be the major underlying cause of mortality, supposedly leading to enhanced susceptibility to infectious agents. This opinion was greatly fostered by McKeown's (1976) claim that infectious diseases declined in the United Kingdom before the availability of vaccines and antibiotics. He ascribed this change to better nutrition due to greater food availability, and suggested that this was the principal cause of the observed decrease in mortality and consequent rise in population. Landers (1992) and others have recently discussed both the infectious disease and nutritional aspects of McKeown's theory and found them wanting, thereby refuting McKeown's claim that socio-economic development was virtually the only explanation for the rise of population. It was not until the magnificent studies of Mata (1978) in the village of Santa Maria Cauqu, in Guatemala that the crux of the problem became reversed, that is, repeated respiratory and diarrhoeal infections in very young children were the primary cause of malnutrition.

In the last several years those concerned with health in the developing world have realized that school-age children were particularly neglected. At a UNESCO meeting in 1989 it was suggested that ubiquitous infection by multiple helminth species in the tropics was the most important factor in poor primary school performance (Halloran, Bundy and Pollitt 1989). Fortuitously, this realization came at a time when the development of several different types of oral, single-dose, non-toxic anthelmintic drugs made it possible to control virtually all of these infections at very low cost (Warren 1990). Soon thereafter micronutrient deficiency, especially in vitamin A, iron and iodine, was identified as another significant and easily remediable problem in this age group. The United Nations Development Programme, the Rockefeller Foundation, the James S. McDonnell Foundation, the Edna McConnell Clark Foundation and the World Health Organization have now organized a Partnership for Child Development that is exploring the effect of these problems on development and cognition, and inexpensive means of ameliorating them. A Scientific Coordinating Centre, led by Professor D.A.P. Bundy, has been established at Oxford University to provide expertise in the implementation and evaluation of school health programs in many countries in Asia, Africa and Latin America.

Young adults are now particularly prone to violent and accidental deaths. Furthermore, the remarkable spread of the almost invariably fatal Human Immunodeficiency Virus is having a major effect on mortality in this age group, especially in the developing world. There is very little at the moment that technology can do about these problems; they are now being be dealt with largely by relatively inefficient social and political approaches.

In 1988 Walsh updated the data on the causes of mortality in the developing world for the United Nations Development Programme, but in this case included all age groups. While respiratory diseases came first, diseases of the circulatory system were second followed by diarrhoeal diseases, measles, injuries and neoplasms. Escovitz (1992) wrote of the health transition in developing countries in the context of a didactic role for specialists of internal medicine from the developed world. He pointed out the importance of gathering data on the prevalence, morbidity and mortality of the chronic diseases of the old, as had been done for the acute diseases of children. Furthermore, he spoke of the development of selective secondary and tertiary care strategies based on both effectiveness and affordability.

Which interventions are effective ?

In his book *Effectiveness and Efficiency* (1989) originally published in 1972, the great British epidemiologist, Cochrane, wrote:

> When I was a medical student in London in the 1930s .... there was to be some rally about the possibility of a National Health Service in some London suburb, and I decided to go alone with my own banner. After considerable thought I wrote out my slogan: ALL EFFECTIVE TREATMENT MUST BE FREE. I had a deep inner feeling that this was absolutely right: although I doubt very much if I would have passed a viva on the meaning of ‘effective’! The slogan, I regret to say, was a flop, ... but I still thought it had something (Cochrane 1989).

While this idea was quite remarkable, Cochrane simply could not lose. Thomas (1983) observed in his essay ‘1937 Internship’ that hospitals were ‘simply custodial’. ‘Whether you survived or not depended on the natural history of the disease itself. Medicine made little or no difference’. Therefore, at the time when Cochrane carried his provocative banner very little effective treatment was available and the costs of health care based on this premise would have been minimal. The catch, however, was that in the 1930s there were no effective methods of determining whether a treatment was effective or not. It was not until the early 1940s that Austin Bradford Hill designed the randomized controlled trial to eliminate bias in the evaluation of interventions (Daniels and Hill 1952). The only other effective method is meta-analysis, which was developed by sociologists several decades ago to pool the results from series of similar papers on the same subject. This powerful tool only began to be applied to medical interventions in the last ten to 15 years.

The problem with evaluating interventions is eliminating opinion based on personal experience, which almost always involves the observation of too few patients, and bias, which is often based on the laudable desire to achieve good results. At a recent New York Academy of Sciences meeting entitled Doing More Good than Harm: The Evaluation of Health Care Interventions, 1993, a variety of methods in addition to randomized controlled trials (RCTS) and meta-analyses (MAs) were evaluated. In 1977 the National Institutes of Health initiated a series of Consensus Conferences (Ferguson 1993) in response to the director Fredrickson's statement that

> NIH and the rest of the scientific community must assume greater responsibility for the effect of research on the quality and cost of health care. The need for assuring effective transfer of useful new knowledge across the interface between biomedical research and the health care community and systems is a major issue.

The key to the process is a panel of scientists, clinicians, bibliometricians, and a public representative who are all interested in the general area, but have never done specific research on the problem. Because of its expense, no evaluation of the literature is done beforehand. Another approach, which is quite costly, was developed at the Rand Corporation; it begins with an exhaustive literature review, but then depends on a panel of nine distinguished practising physicians to decide which patients, if any, the procedures would benefit (Brook 1993). Finally, there is an approach with the particularly compelling name of 'outcome analysis'. It seems reasonable that if the outcomes of all interventions could be monitored, their efficacy would become immediately apparent. Unfortunately, this is simply not so, except in the simplest of situations where the results are particularly striking. Without randomized selection of patients, and in many cases the use of appropriate blinding, it is virtually impossible to eliminate opinion and bias. The usual outcome of outcome analysis is to follow-up interesting leads with randomized controlled trials.

> Sir Richard Doll (1993) summed up the conference with these words: 'I conclude that we have need for both overviews (MAs) and large-scale simple randomized trials because they provide the only techniques for making small advances in the treatment of common conditions.' He added that if these matters were 'taken to heart by the profession and by those responsible for providing medical care [it] will ensure that the conference marks a turning point in the history of medicine in the developed world' (Wennberg et al. 1993).

A major advance in broadening the use of the best methods for evaluating interventions and the dissemination of the results thereof is the establishment of the Cochrane Centre in Oxford by the UK National Health Service Research and Development Programme. The Centre is led by Dr. Iain Chalmers, the senior editor of the first textbook of medicine, *Effective Care in Pregnancy and Childbirth* (1989), based on evidence largely provided by RCTs and MAs. His group also developed the computer software to prepare meta-analyses and to keep them up-to-date. An international network, the Cochrane Collaboration, has grown from this experience which prepares and maintains systematic reviews of RCTs covering all of the fields of medicine and health (Chalmers 1993). We now have the methods, both statistical and digital, for determining the effectiveness of treatment, and groups such as the Cochrane Collaboration are making a critical mass of such crucial information available, and keeping it current.

This leads to us to one area that is almost studiously avoided: the enormous utilization of alternative medical systems, not only in the developing world but the developed world as well. In China there is the vast, sanctioned world of traditional medicine. India has Ayurvedic medicine, for which 'Western medicine' may be the alternative. In the United Kingdom it is well known that many members of the royal family, among others, have an interest in alternative medicine. For the United States, a recent study has examined alternative, unconventional, unorthodox forms of medicine, including relaxation techniques, chiropractic, massage, spiritual healing, herbal medicine, megavitamin therapy, energy healing, hypnosis, homoeopathy, acupuncture, and folk remedies. It was found that there were an estimated 425 million visits to unconventional therapists in 1990, exceeding all visits to primary care physicians (388 million). Expenditures on unconventional therapy were approximately $13.7 billion, of which $10.3 billion was out-of-pocket. This compares with $12.8 billion spent out-of-pocket for all hospitalizations in the United States (Eisenberg et al. 1993). Under political pressure by the Congress, the National Institutes of Health has recently set up a program to evaluate alternative treatment, an initiative that should be going on all over the world. Unfortunately, meagre funds and political interference have led to the resignation of the first director of this important program.

The particular importance of such an initiative in the developing world is graphically described in a superbly controlled study of modern and traditional health systems in two Nigerian villages (Orubuloye and Caldwell 1975). These villages, one with good medical facilities (Ido) and the other with no facilities other than the traditional ones (Isinbode), were culturally and geographically as similar as possible and their social and economic indices showed no great difference except in the provision of medical services. Deaths per thousand among under-one-year-olds in Ido (medical facilities) were 99 compared with 288 in Isinbode (traditional); life expectancy at birth was 52 in Ido and 24 in Isinbode.

Application

A recent conference organized by the New York Academy of Sciences, Doing More Good Than Harm (Doll 1993), opened with a paper entitled 'All effective treatment could be free' (Warren 1993). This paraphrase of Archie Cochrane's famous statement was done advisedly, in view of the State of Oregon's recent development of a health plan that would not reimburse for ineffective or questionable therapies in order to afford more equitable health care. This pioneering approach, which the *Wall Street Journal* (1993) described as 'an unprecedented way to expand basic medical coverage to all people living in poverty,' was approved for implementation by the Clinton administration of the American government on 19 March 1993.

The basic concept of the Oregon plan is to 'prioritize health services in an era of limits' (Kitzhaber 1993). By eliminating categories covering minor conditions, futile care, and services that have little or no effect on health services, they were able to reduce costs so that 95 per cent of the population under the age of 65 were covered by the state health plan. Only part-time workers with incomes above the poverty level and seasonal workers were not covered. Those over 65 were enrolled in the federal Medicare program.

The process of prioritization was largely a social and political one. A Health Services Commission was created, consisting of five primary-care physicians, a public health nurse, a social worker and four consumers. They were charged with developing a list of services ranked in priority from the most important to the least important, according to the comparative benefits of each service to the entire population being served, and judged by clinical effectiveness and social values. The determination of clinical effectiveness was provided by panels of physicians who were asked to supply information about each condition-treatment pair in their areas of practice. It was recognized that 'this information provides a consensus by physicians rather than hard empirical outcomes data'. It is worthy of note that the prioritization process is dynamic and continuing with a new list generated each budget cycle 'to take into consideration new technologies and new information on outcomes' (Kitzhaber 1993).

Furthermore, the commission set up a broad-based public process to identify and integrate social values into the process, through extensive community meetings and a series of public hearings. The first priority list consisted of 709 condition-treatment pairs. Those ranked highest were for acute, fatal conditions where treatment prevents death and returns individuals to their previous health state. High values were placed on prevention, and maternal, dental and hospice care. The final priority list was given to an independent actuarial firm, which determined the cost of delivering each element through capitated managed care. On the basis of this information the Oregon legislature appropriated new revenue funding all condition-treatment pairs to line 587 on the list of 709. It is important to realize that this benefit system, modified over the years, will become the standard benefit offered by all private policies in the state. The Oregon plan, approved overwhelmingly by both houses of the state legislature, is clearly a social and political triumph. The 'scientific approach' to prioritization, however, while explicit, was unscientific, being essentially a matter of opinion.

This brings us to the enormous opportunity offered by the burgeoning of large-scale randomized evidence, now being gathered together by the global Cochrane Collaboration, and being maintained in continuously updated digital form. The combination of this sophisticated scientific evidence with the remarkable social and political process pioneered by the State of Oregon can truly offer the possibility that all effective treatment can be provided by comprehensive health systems at affordable cost.

Rationalizing health care

Health care systems in many parts of this aging world are grossly deficient. Even in countries where they have functioned well in the past they are breaking down because of high public expectations, inequities, inefficiencies and unsupportable costs. In order to have an efficient health care system it is essential to have quantitative estimates of the age-specific disease burdens in the population and to develop strategies for preventing and treating disease with known effective and, wherever possible, low cost interventions.

References

Banerji, D. 1986. Technocentric approach to health: Western response to Alma-Ata. *Economic and Political Weekly* 21:1233.

Barsky, A.J. 1988. The paradox of health. *New England Journal of Medicine* 318:413-418.

Black, D.A.K. and J.D. Pole. 1975. Priorities in medical research. Indices of burden. *British Journal of Preventive and Social Medicine* 29:222-227.

Chalmers, I. 1993. The Cochrane Collaboration: preparing, maintaining, and disseminating systematic reviews of the effects of health care. Pp. 156-165 in *Doing More Good Than Harm: The Evaluation of Interventions*, ed. K.S. Warren and F. Mosteller. *Annals of the New York Academy of Sciences* 703.

Cochrane, A.L. 1989 (reprint). *Effectiveness and Efficiency: Random Reflections on Health Services.* Cambridge: Cambridge University Press.

Daniels, M. and A.B. Hill. 1952. Chemotherapy of pulmonary tuberculosis in young adults. An analysis of the combined results of three Medical Research Council trials. *British Medical Journal* 1:1162-1168.

Doll, R. 1993. Summation of the conference. Pp. 310-313 in *Doing More Good than Harm: The Evaluation of Interventions,* ed. K.S. Warren and F. Mosteller. *Annals of the New York Academy of Sciences* 703.

Eisenberg, D.N., R.C. Kessler, C. Foster, F.E. Norlock, D.R. Calkins and T.L. Delbanco. 1993. Unconventional medicine in the United States: prevalence, costs, and patterns of use. *New England Journal of Medicine* 328:246-252.

Escovitz, G.H. 1992. The health transition in developing countries: a role for internists in the developed world. *Annals of Internal Medicine* 116:499-504.

Ferguson, J.H. 1993. NIH conferences: dissemination and impact. Pp. 180-199 in *Doing More Good Than Harm*: *The Evaluation of Interventions*, ed. K.S. Warren and F. Mosteller. *Annals of the New York Academy of Sciences* 703.

Grant, J.P. 1983. *The State of the World's Children 1982-83.* New York: Oxford University Press.

Grosse, R.N. 1980. Interrelation between health and population. Observations derived from field experiences. *Social Science and Medicine* 14C:99-120.

Halloran, M.E., D.A.P. Bundy and E. Pollitt. 1989. Infectious disease and the UNESCO basic education initiative. *Parasitology Today* 59:359-362.

Halstead, S. B, J.A. Walsh and K.S. Warren. 1985. *Good Health at Low Cost.* New York: Rockefeller Foundation.

Kinsley, M. 1995. The intellectual free lunch: everybody's entitled to an opinion, right? Wrong. *New Yorker 6* February:4-5.

Kitzhaber, J. A. 1993. Prioritising health services in an era of limits: the Oregon experience. *British Medical Journal* 307:373-377.

Lancet. 1995. Fortress WHO: breaching the ramparts for health's sake. 345:203-204.

Landers, J. 1992. Introduction. Pp. 1-28 in *Historical Epidemiology and the HealthTransition,* ed. J. Landers. *Health Transition Review* 2 (Supplement).

Mata, L. 1978. *The Children of Santa Maria Cauqu,: A Prospective Field Study of Health and Growth.* Cambridge MA: MIT Press.

McCord, C. and H.P. Freeman. 1990. Excess mortality in Harlem. *New England Journal of Medicine* 322:173-177.

McKeown, T. 1976. *The Modern Rise of Population.* New York: Academic Press.

Orubuloye I.O. and Caldwell J.C. 1975 The impact of public health services on mortality: a study of mortality differentials in a rural area of Nigeria. *Population Studies* 29:259-272.

Rifkin S.B. and G. Walt. 1986. Why health improves: defining the issues concerning 'comprehensive primary health care' and 'selective primary health care'. *Social Science and Medicine* 23:559-566.

Ross, Ronald. 1928. *Studies on Malaria.* London: John Murray.

Thomas, L. 1983. *The Youngest Science.* New York: Viking Press.

Walsh, J.A. 1988. *Establishing Health Priorities in the Developing World.* New York: United Nations Development Programme.

Walsh, J. A. and K.S. Warren. 1979. Selective primary health care: an interim strategy for disease control in developing countries. *New England Journal of Medicine* 30:967-974.

Warren, K.S. 1990. An integrated system for the control of the major human helminth parasites. *Acta Leidensia* 59,1 and 2:433-442.

Warren, K.S. 1993. All effective treatment could be free. Pp. 1-4 in *Doing More Good Than Harm: The Evaluation of Interventions,* ed. K.S. Warren and F. Mosteller. *Annals of the New York Academy of Sciences* 703.

Wennberg, J.E., M.J. Barry, F.J. Fowler and A. Mulley. 1993. Outcomes research, PORTs, and health care reform. Pp. 52-62 in *Doing More Good Than Harm: The Evaluation of Interventions,* ed. K.S. Warren and F. Mosteller. *Annals of the New York Academy of Sciences* 703.

World Bank, *World Development Report 1993: Investing in Health.* New York: Oxford University Press.

World Health Organization (WHO). 1978. *Declaration of Alma Ata (Report on the International Conference on Primary Health Care, Alma Ata, USSR, September 6-12, 1978).* Geneva.

Forum: Health Transition Review 7, 1997, 73-107

What are the limits?

John C. Caldwell

Health Transition Centre, Australian National University, Canberra

Forums, at least in this journal, have a life of their own. The contributors interpret the posed questions in ways which catch the forum organizer by surprise, thus producing a different, if no less valuable, contribution to knowledge, than had been envisaged. This certainly happened on this occasion, although the underlying demand, that researchers in the health transition and public health fields should remain vigilantly introspective, was met.

The organizer had in mind the following kinds of question which will be illustrated by examples from four areas: physical fitness; AIDS, especially in sub-Saharan Africa; smoking; and female circumcision. The central issue is the balance of individual rights against those of the larger community. To what extent should health researchers support the community or governments in coercing individuals or placing emotional pressure on individuals, especially if most of the risk is to be taken by the individual? There is also the issue as to whether health researchers have always proved their conclusions, or whether some become enthusiastic advocates at a time when the research base is still insecure.

In terms of physical fitness, there can be little doubt that the public health movement has gone beyond offering alternatives in lifestyles and eating habits and has associated fatness with foolishness at one extreme and sinfulness at the other. There has also been a reluctance to discuss the hereditary component, and whether periodic bouts of dieting really do lower mortality.

The AIDS epidemic raises a whole raft of issues. In sub-Saharan Africa most governments have made surprisingly little effort to change the sexual behaviour of their populations (cf. Caldwell, Orubuloye and Caldwell 1992), at least as judged by the international community. It is a reasonable assumption that many government leaders believe that the existing patterns of sexual behaviour are deeply culturally embedded, that they are the choice of the people, and that massive informational interventions would change little in behaviour while increasing the sum total of human unhappiness. Few foreigners feel that this is a responsible position, but we may be shaped by a kind of protestantizing of the global community. On the other hand many Africans regard it as irresponsible for a doctor not to tell the partner of a seropositive person the situation, especially in a region where research has shown that the infected person is most unlikely to divulge the information. They feel that international public health principles have been forged in different societies, especially ones where homosexual communities of significant size have been justifiably attempting to retain gains made against stigmatization.

Health researchers have generally supported governments not only in stigmatizing smokers and greatly restricting the areas where they can indulge their habit, but also in raising taxes or excises on cigarettes, often at the cost of impoverishing further many of the poorest families in the community. There are issues here which desperately need not only introspection but adequate social research.

Most of us support efforts to eliminate female circumcision, but advocates in this area are not pleased by research that shows that one product of the campaigns has been to return the operation from trained health workers to unhygienic and often dangerous traditional circumcisers (cf. Caldwell, Orubuloye and Caldwell 1997:1188ff.).

These issues are touched upon by the contributors to the forum, especially Adeokun. He raises a question of growing importance, whether health authorities in Africa should withhold from individual capable seropositive mothers the information that refusing to breastfeed a child will reduce the chances of the vertical transmission of HIV, because of the belief that, should the whole community act in this way, infant mortality would increase. A similar situation may be developing with regard to male circumcision, where the information that it probably offers some protection against HIV infection may be withheld because of the perhaps mistaken fear of aggravating inter-ethnic friction.

The major issue raised by the contributors (Cohen, Farmer and Kleinman; Findley et al.; Renne) is the restriction placed upon health interventions by the health providers failing to take into account the circumstances of their potential patients and hence failing to provide a service easily accessible to all. Thus the contributors surprised the organizer by arguing that public health workers should primarily be introspective not about how far they go but about not going far enough. In all their examples they were no doubt right, but the choice of examples may show the predilection of professionals in their own specialty. Kunitz implies that the health field must bear some responsibility for not providing better communications between researchers and policy-makers. Renne draws our attention to professionals beyond the health field by questioning whether economic rationalists urging the ‘user pays’ principle in the health field really understand the human implications in countries like Nigeria, and whether they have a moral obligation to understand those implications before recommending economic policy.

Kunitz raises the interesting point that the anti-alcohol campaign in America’s Indian population argued that the aim was to restore traditional behaviour. It is unclear whether this was mostly a stratagem, or whether the health workers themselves valued this justification. It parallels the attempt, based on much weaker historical evidence, of some advocates in the 1960s and 1970s of Third World family planning programs to argue that pre-Western contact peoples had always intentionally controlled their numbers. It also raises the question whether First World populations, apart from the political enthusiasts for the traditional family, believe that their societies should return to past ways.

Finally, there is a question as to the extent to which the research justifies the intervention. Sköld justifies compulsory smallpox vaccination in Sweden on the grounds that it kept smallpox mortality low thereafter, but another interpretation of his Table 2 is that voluntary inoculation had proved sufficient, and compulsory vaccination added little during the subsequent half-century.

References

Caldwell, J.C., I.O. Orubuloye and P. Caldwell. 1992. Underreaction to AIDS in sub-Saharan Africa. *Social Science and Medicine* 34,11:1169-1182.

Caldwell, J.C., I.O. Orubuloye and P. Caldwell. 1997. Male and female circumcision in Africa: from a regional to a specific Nigerian examination. *Social Science and Medicine* 44,8:1181-1193.

Offer and request: preventive measures against smallpox in Sweden 1750-1900.

Peter Sköld

Dept. of Historical Demography, Umeå University, Sweden

Smallpox was a feared and dreadful killer all over the world during the eighteenth century. In Sweden the disease was a dominating cause of death and parents had to accept that their children were likely to be infected by the disease at least at the age of ten. These circumstances created a fatalistic attitude since the great number of deaths seemed to demonstrate the impossibility of control by man or medicine. Before 1750 Swedish physicians did not know of any efficient measure to prevent the raging smallpox epidemics. In the following decade the Medical Board started to discuss the possibility of carrying out experiments with inoculation (variolation), a method that had been practised in Britain for almost thirty years (Miller 1957). Putting pus from a smallpox crust into the arm of a susceptible child was intended to give a slight infection which would not cause death but which would give immunity. However, the method involved risks and the medical authorities were posed a delicate problem; how should inoculation be organized and which strategy should lead them through the process?

Judging the risks of inoculation

Razzell (1977:20-22) estimates that about one per cent of the inoculated children in Britain between 1721 and 1740 died as a result of the immunization. This was mainly due to the depth of the incision employed. Another factor that discredited inoculation was the risk of infection for those persons who had not been previously immunized. Moreover, mid-eighteenth-century physicians were not sure of eventual complications that could follow. In this situation medical authorities in both Britain and Sweden found it best to try inoculation on defenceless persons. In Britain an experiment was carried out on prisoners in Newgate. All of them, three women and three men, were sentenced to the death penalty and had to choose between execution and inoculation. In 1743 the method was made compulsory for children at the Foundling Hospital in London (Silverstein 1989:24-35). The Swedish medical authorities followed the same strategy and started with the inoculation of children at the Orphanage in Stockholm (Sköld 1996a:259-262). We can see that the mercantile ideology allowed experiments where the lives of humans were risked. However, the initial inoculations were successful and no children died.

The official view, held by both the physicians and the Medical Board, was that inoculation was too dangerous for other than skilled doctors to practise. Money was one of the motives behind this decision, but inoculation was also important for physicians when they strove for a better social position. Risse (1992:191) states that in accordance with humoralism, physicians quickly transformed the rather simple folk method into a complex medical procedure. In Britain the physician Buchan described how several colleagues tried to make people believe that they had knowledge which made it possible only for them to be successful with inoculation. Buchan considered this to be humbug, since commonsense and carefulness were enough. His vision was that inoculation should become universal and accessible for everyone; he even imagined that parents would inoculate their own children (King 1958:323).

The public considered inoculation a risk, associated with both pain and cost. Owing to the fatalistic attitude and to the limited possibilities of the monopoly system the method was rarely practised in Sweden throughout the eighteenth century (Sköld 1996b:249-253). The Swedish Parliament and the medical authorities rejected all proposals to use the force of law to extend the practice. Instead they believed in a strategy by which prominent persons should act as good examples by having their children inoculated. The children of the rich certainly dominated inoculation in Sweden; however their example was seldom followed by others. This opposition had many causes, some of them rooted in prejudice and fatalism while others were expressions of true fear of the method. Parents explained to the medical officers that they could never agree to take a decision which involved any risk for their children, since this would make them actively responsible for the outcome. This often resulted in reports from the physicians stating that the public was stupid and stubborn in its attitude. The dominating fact that convinced most people that it was destiny that ruled, was that many, despite miserable food and care and without being inoculated, nevertheless survived an attack of smallpox.

Sköld (1996a:292-294) has concluded that approximately 0.36 per cent of the inoculated children in Sweden between 1756 and 1801 died. Nevertheless, numerous rumours made the public sceptical, one of the most frequently quoted being that no one who was inoculated would live for more than forty years. We must also remember that physicians and medicine were often not trusted by the public, who relied on folk medicine cures instead. Many parents refused to hand their children over for those two weeks the physicians claimed were necessary for preparation and care-taking. Instead they wished inoculation to be carried out in their homes, something the medical authorities did not approve since they were afraid of spreading smallpox.

Request and reluctance

An interesting change occurred during the last decade of the eighteenth century. In many Swedish regions physicians started to report increased inoculation and apparently the method became more and more accepted amongst the public. The medical authorities still believed informative pamphlets to be the best strategy to implement inoculation, but it is likely that seeing their neighbours have their children successfully inoculated persuaded most previously sceptical parents. From 1795 it seemed that immunization against smallpox had reached a turning-point, but suddenly physicians became reluctant to perform inoculation.

Hudson (1983:183-184) concluded that it was difficult to establish whether inoculation started epidemics or not, since the physicians often waited for an epidemic before they started. This was only partly true for Sweden, since many physicians were afraid of being blamed for starting the smallpox epidemics. Smallpox has been considered to be a very contagious disease, which explains the Swedish name *smittkoppor*: contagious pox. This apprehension has been challenged in later research on infectious disease. Such an approach is present in the following where Baxby concludes that epidemics were a problem in Britain and the judgement he makes is probably even more true for Sweden:

> From that time until variolation was made illegal in 1840 the fear that it might transmit smallpox to susceptible contacts was one of the main problems which prevented its unrestricted use. As natural smallpox is not very communicable, and inoculated smallpox might be expected to be less so, the fear was possibly misplaced but very real nevertheless (Baxby 1981:30).

It is not likely that inoculation was responsible for starting smallpox epidemics in Sweden. Nevertheless, several rumours blamed the preventive method for doing so. Physicians denied that any great risks were involved in the practice, but since they were afraid of being blamed for spreading smallpox most of them did not want to inoculate during an epidemic. On the other hand parents were most willing to inoculate their children when smallpox infections and deaths had occurred in their village or town. We can see that the situation involved some difficulties for the practice of inoculation in Sweden: the relationship between offer and request was not characterized by interplay but by contradiction.

Introduction of vaccination

In 1796 Edward Jenner carried out his first experiments with vaccination in Britain. By using cowpox lymph instead of smallpox matter he excluded the previous risks that had been involved in immunization against smallpox. The first vaccination in Sweden was carried out in 1801 and the new method more or less eliminated the practice of inoculation. Physicians and most people found great advantages in the new method. Apart from medical, financial, organizational and technical factors there were also emotional reasons for this change of attitude. When vaccination had been introduced it was soon apparent in the district physicians' annual reports that they had seen great risks in the practice of inoculation. The district physician of Halland, J. L. Westerberg, expressed his views in the annual report of 1802:

> I carried out inoculation on two children of the upper class, on the insistent request from the parents, in the beginning of April, with matter from natural smallpox, inoculation resulted quite properly. But this is for sure the last time I will carry out inoculation subjected to human smallpox; because the anxiety I have been put through, I cannot express, before the disease to my and the children's favour went through, when I knew the credit vaccination already had acquired, the security whereby it was carried out (Westerberg 1803:6).

The introduction of vaccination was met with little resistance in Sweden and the method was soon accepted by the majority of the population. Nevertheless, many physicians and vaccinators complained that several children in their parishes remained unvaccinated. It was soon obvious that the idea of a compulsory law was seen by many as the only way to make vaccination general, which would lead to the possibility of eradicating smallpox. The Medical Board had tried to stimulate vaccination using different measures, but a compulsory law had not been discussed during the first years of its practice. However, complaints reached them which said that not even the church, county governor and king urging people to vaccinate their children had helped. It was often said that '… it is not compulsion, well, but if it will be nobody can resist it'. When the vaccinator exhorted people to follow the instructions from the Medical Board people answered that '… infringing of these instructions could not be especially dangerous, since they were not punishable by any fine' (Sköld 1996a:442).

The compulsory law

In 1816 Sweden was one of the first countries in the world to introduce a compulsory law for vaccination.[1] In the Parliament debate the estate of the Clergy differed from the others. A majority of its members rejected the proposal, realizing that it was the clergy in the parishes that would have to confront the inhabitants with compulsion and they were not interested in

---

[1] Early compulsory vaccination laws were introduced in Bavaria in 1807, Denmark in 1810 and Norway in 1811. These did actually state indirect obligation. In Denmark for example, people needed a vaccination certificate in order to get confirmed or married. The Swedish law had no such links, it simply stated that a fee was required for those parents who had not vaccinated their children before the age of two years (Stein 1987; Völker 1990).

carrying out this duty. Opposition to compulsory vaccination in Europe was mainly the result of individualism and civil disobedience. Protests were also heard from physicians, displeased with state intervention in medical health care (Beck 1960:310-312; Lambert 1962:6-7; MacLeod 1967:211-212). Vaccination was practised under compulsion in Sweden without any discussion until the late 1850s. Then arguments were put forward explaining that the method involved dangers and lacked any permanent effect. The debate was intensified in the 1870s and 1880s; nevertheless organized anti-vaccination activity did not take place until the early twentieth century.

The first petition for the abolition of compulsory vaccination was presented to the Swedish Parliament in 1856-58. It was argued that it was not the privilege of the State to force mothers to inoculate a substance into the bodies of their children, which they believed was more dangerous than useful. The same arguments were used in the Parliaments in 1859-60 and 1862-63 when it was also stated that other diseases could be transmitted and compulsion was against the will of the individual. ‘In other cases of sickness, even when death stands in the door, man has a freedom of choice to accept or reject the medicines, which are given to him’, the critics argued. It was even claimed that vaccination could be the cause of the increase in several other diseases in Sweden and the explanation of the deteriorating physical status of Swedish recruits over the last 20-30 years (Sköld 1996a:451-452).

Revaccination and an alternative strategy

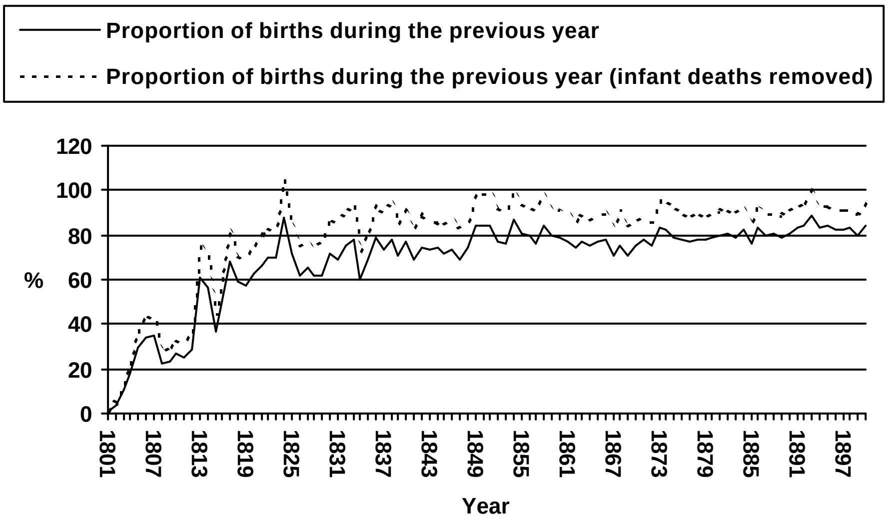
Most arguments that were used against vaccination, such as medical, economic and statistical, have been falsified by later research. The risks were not great, even if it occasionally happened that vaccine pocks were infected and severe complications occurred. Most vaccinators who complained about prejudice against vaccination did not consider too deeply the reasons for this. However, a recurrent reason was the care of the child. Many parents did not want to vaccinate their children before their birthday because they believed it was too dangerous. The eighteenth-century attitude was preserved insofar as some parents rejected vaccination explaining that they could never forgive themselves if anything happened. It was better to let matters take their own course.

Nevertheless, most parents were willing to have their children vaccinated and when it was discovered that the method had only a limited duration of protection several adults requested re-vaccination for themselves, especially when reports of smallpox infections in the neighbourhood reached them. Revaccination of the whole population was, however, never discussed by the medical authorities. Instead they would rely on an organizational approach which during the eradication campaign in Asia and Africa of the 1970s was called containment vaccination. This meant that the practice was intensified in areas where smallpox occurred, in order to quickly limit the transmission of the disease (Sencer 1975:18-21). There was a clear link between smallpox outbreaks and revaccination in Sweden during the latter half of the nineteenth century. In other areas, however, revaccination was seldom practised. Over time the capacity for effective revaccination helped to avert the outbreak of large-scale smallpox epidemics (Sköld 1996a:479-496).

Conclusion

Eighteenth-century physicians held a monopoly of inoculation which mainly explains why the method was rarely practised in Sweden. The medical authorities meant that the risks involved were too great for making inoculation compulsory. Smallpox epidemics were not hindered by preventive immunization and the disease was a dominating cause of death throughout the century. Vaccination on the other hand was not dangerous and a compulsory law was introduced soon after its introduction. By keeping the vaccination rates higher than 90 per cent from the 1830s it was possible for Sweden to register a low smallpox mortality during the nineteenth century and finally to eliminate the disease as a cause of death in the early twentieth century.

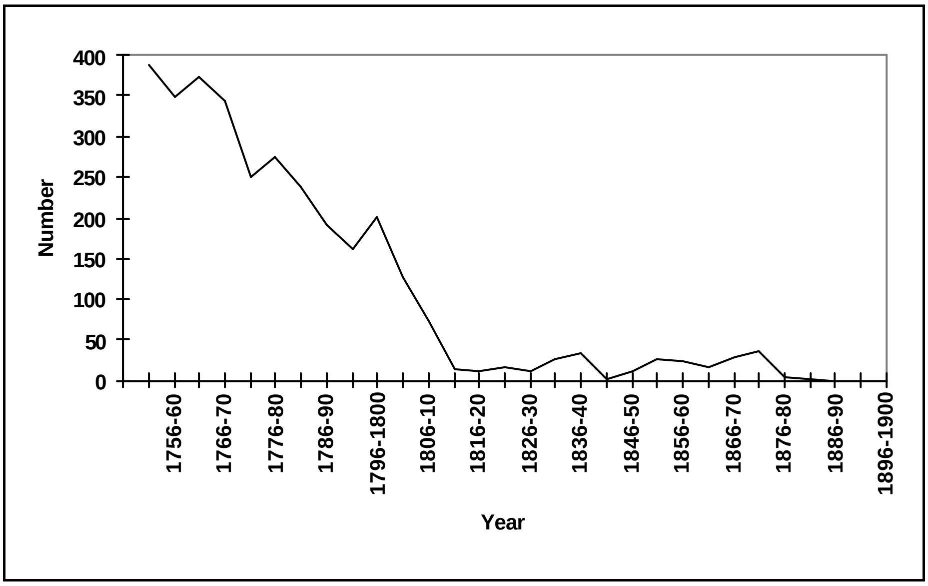
Figure 1
Vaccination rates in Sweden 1804-1900 calculated after two different methods



Source: Population records, Sweden 1795-1855. The older archive of the Table commission. BIIa:3-12. National archives. *BiSOS* serie K. 1860-1900. *Historisk Statistik* 1969:90-96.

Figure 2
Smallpox mortality rates per 100,000, Sweden 1751-1900

(five years averages)



Source: Bidrag till Sveriges officiella statistik (BiSOS), serie K, 1860-1900. Sundbärg 1906:109-160. Compiled population records. The older Table commission Archive, National Archives.

It is apparent that the compulsory law was important and we can only speculate what would have happened if the compulsory strategy had been replaced by containment vaccination, that is, intensified campaigns in times and areas threatened by smallpox epidemics. Perhaps it was not necessary to force the population to immunize their children? It is, however, important to keep a wider perspective. Sweden belonged to an international regime of infectious epidemics and by the decrease in smallpox mortality neighbouring countries were helped as well. When smallpox was totally eradicated from the world in the 1970s it was the result of a long-term process which had started with initiatives in the developed countries and which was continued and intensified in underdeveloped countries during the 1960s (Fenner et al. 1988). One of the great killers had been defeated and with this outcome we might conclude that compulsory vaccination had been successful during the nineteenth century while voluntary inoculation during the eighteenth century had failed.

References

Baxby, D. *Jenner’s Smallpox Vaccine. The Riddle of Vaccinia Virus and its Origin.* London: Heinemann Educational Books.

Beck, A. 1960. Issues in anti-vaccination movement in England. *Medical History* 4:310-321.

Fenner, F., D.A. Henderson, I. Arita, Z. Jezek and I.D. Ladnyi. 1988. *The Eradication of Smallpox.* Geneva: World Health Organization.

Hudson, R. P. 1983. *Disease and Its Control. The Shaping of Modern Thought.* Westport, Connecticut: Greenwood.

King, L. 1958. *The Medical World of the Eighteenth Century.* Chicago: American Medical Association.

Lambert, R. 1962. A Victorian national health service: state vaccination 1855-71. *Historical Journal* 5,1:1-18.

MacLeod, R. M. 1967. Law, medicine and public opinion: the resistance to compulsory health legislation 1870-1907. *Public Law* Summer:107-128, 189-211.

Miller, G. 1957. *The Adoption of Inoculation for Smallpox in England and France*. Philadelphia: University of Pennsylvania Press.

Razzell, P. 1977. *The Conquest of Smallpox. The Impact of Inoculation in Eighteenth Century Britain.* Firle: Caliban Books.

Risse, G. 1992. Medicine in the Age of Enlightenment. Pp. 149-196 in *Medicine in Society. Historical Essays*, ed. Andrew Wear. Cambridge: Cambridge University Press.

Sencer, D.J. 1975. Lessons for the future. *World Health* Feb.-March: 18-21.

Silverstein, A. 1989. *A History of Immunology*. San Diego: Academic Press.

Sköld, P. 1996a. *The Two Faces of Smallpox. A Disease and Its Prevention in Eighteenth- and Nineteenth Century Sweden.* Umeå: Demographic Database, Umeå University.

Sköld, P. 1996b. From inoculation to vaccination: smallpox in Sweden in the eighteenth and nineteenth centuries. *Population Studies* 50,3:247-262.

Stein, J. 1987. Die Pokkenvakzination in Preussen bis zum Reichsimpfgesetz von 1874 unter besonderen Berücksichtigung des Regierungsbezirkes Frankfurt (Oder). *Zeitschrift für ärtzliche Fortbildung* 81,20:1081-1083.

Völker, A. 1990. Einige Markierungspunkte aus der Geschichte der Pockenschutzimpfung. *Zeitschrift für die gesamte innere Medizin und ihre Grenzgebiete* 13:392-396.

Westerberg, J. L. 1803. Annual report from the district of Halland. *Läkaren och Naturforskaren* 13:4-8.

Health-behaviour interventions: with whom?

Alex Cohen, Paul Farmer and Arthur Kleinman

Department of Social Medicine, Harvard Medical School

Almost invariably, health-behaviour interventions are directed at patients, clients, or populations without scrutinizing the systems — the institutions and professionals — that provide the health services to determine if care and treatment are of high quality and readily accessible to those most in need of services: the poor and destitute. Analyses documenting the constraints on patients’ ability to respond to health-behaviour interventions are infrequent, and critical questions, for example what is the degree to which personal agency directs the effectiveness of care?, are left unposed. Too often, people are blamed for not taking advantage of treatments or making changes in their behaviour when the providers of care are the problem because of their reluctance to change established, but ineffective delivery systems or to consider the everyday needs of the patients. In this brief commentary, we argue, from our fieldwork in the Skid Row area of Los Angeles and in the central plateau of Haiti, as well as a study conducted in rural China, that the causal link between so-called behaviour problems of individuals and groups and deleterious health outcomes is not as apparent as is often assumed.

Paul Koegel (1987, 1992) has written that when examining the ‘ecology of service areas’, it is necessary to consider ‘service-resistant service providers’ and ‘service-resistant service settings’, as well as ‘service-resistant clients’. Such a holistic perspective offers a better framework in which to evaluate the nature of health-related behaviour among individuals and providers and, thus, determine at whom interventions might most effectively be directed. In this instance, Koegel was citing ethnographic details about the lives of homeless mentally ill persons in the Skid Row area of Los Angeles, evidence that revealed that apparently inexplicable and evidently maladaptive behaviour was understandable, at least in the context of the Skid Row environment (see also Cohen 1993; Cohen and Koegel 1996). For example, Koegel notes that one could appreciate why some homeless mentally ill persons opted to sleep on the streets rather than in one of the hotels in the area because they were not so much ‘havens from the elements’ as

> tiny rooms with a bare bed and a sink to urinate in, the bathroom down the hall being too disgusting to use. They are hot in the summer, cold in the winter, filthy, vermin-infested, and dangerous all year round (Koegel 1992:14).

More to the point in regard to this forum on the ethical issues involved in health behaviour interventions is the following example from Skid Row. By the best available estimate, there are, on any given night, about 5,000 homeless persons in the Skid Row area of Los Angeles (Koegel, Burnam and Morton 1993). Epidemiological work has demonstrated that about 25 per cent (1250) of these homeless persons suffer from severe mental disorders (Burnam and Koegel 1991; Koegel, Burnam and Farr 1988). There was, in the period 1987-1992 when fieldwork was conducted, only one community mental health clinic in Skid Row. This agency, which was functioning beyond maximal capacity, was serving, to varying degrees, the needs of approximately 400 people — meaning that about 850 severely mentally ill individuals were without continuing services and treatment. In fact, if all of the persons in need of the services of the community mental health clinic had requested treatment, the clinic would have been overwhelmed to the point of collapse. Who, then, was non-adherent? The homeless mentally ill denizens of Skid Row who did not always take their haldol or lithium, or the society that had failed to provide them with adequate shelter and care? Is a homeless mentally ill person ‘non-compliant’ if he or she does not seek treatment when treatment is not available?

Health behaviour is a source of great concern in the treatment of tuberculosis, because inconsistent or interrupted medication leads to poor outcome and increased numbers of new infections, and increases the likelihood of the emergence of drug-resistant strains which are vastly more difficult and expensive to treat than drug-susceptible strains, and exact high rates of mortality (Centers for Disease Control and Prevention 1990; Goble, Iseman and Madsen 1993; Iseman 1993). Yet is it valid to always blame patients or, as is often the case, their cultural beliefs, when treatment fails? Our work in Haiti makes us question this assumption. Farmer (1997) presents a case history of a young Haitian man who developed multi-drug-resistant tuberculosis although he made heroic efforts to keep appointments, and made every attempt to comply with his physician’s orders, and whose family made great financial sacrifices to obtain the prescribed medications he required. Nevertheless, as a result of substandard care and the uncertain availability of medications due to the country’s political instabilities, this young man died after nine years of strict compliance with a brutal regimen. We would maintain that in places like Haiti, the culturally shaped aetiological beliefs of poor patients do not predict compliance with chemotherapy for tuberculosis. Rather, rates of adherence to therapy in Haiti’s central plateau were associated with free and convenient care in combination with access to supplemental food and income. In the end, we must conclude that although the poor are most ‘at risk’ of developing or acquiring multi-drug-resistant tuberculosis, so-called 'problem behaviours' are not so much the cause of treatment failure as is the fact that the poor are those most 'at risk' of being unable to obtain adequate care for this or any other disorder.

We do not mean to suggest, however, that nothing short of the elimination of poverty and political strife will ensure effective treatment of tuberculosis among specific populations, although such developments would have enormous beneficial effects. The experience of tuberculosis control effects in the United States provides an example of how changes in the delivery of services can bring about dramatic changes in the rate at which patients follow treatment regimens. As reported by Francis J. Curry (1968; 1975), former head of the Division of Tuberculosis Control, San Francisco Health Department, the rate of non-adherence among patients at the Chest Clinic at San Francisco General Hospital was distressingly high. In 1961, research found that more than 26 per cent of the scheduled appointments at the clinic were not kept. It was also found that the rates of missed appointments were highest amongst three distinct social groups: Chinese (25%), African-Americans (50%), and the overwhelmingly White alcoholics of the city's Tenderloin district (65%). Interviews at the clinic revealed that both patients and staff recognized the problem of missed appointments but attributed the causes to entirely different factors. Whereas staff concentrated on characteristics of 'problem patients' (e.g. language barriers, advanced age and alcoholism), patients focused on problems with the clinic (e.g. inconvenient hours and location, lengthy waits in unpleasant conditions, and the punitive and judgemental attitudes of staff).

Recognizing that the degree to which a program is accepted and used depends on resolving 'patient problems' rather than demanding behavioural changes on the part of 'problem patients', the Division of Tuberculosis Control decided to decentralize treatment services and established three neighborhood clinics: one in Chinatown, another in the predominantly African-American Westside health district, and a third in St. Anthony's Dining Room in the Tenderloin district. These clinics opened in April, 1962; all provided, if necessary, home visits by public health nurses. Immediately, rates of missed appointments dropped precipitously. In the first year, patients at the three neighbourhood clinics missed only 5.4 per cent of their appointments. Nor was this success short-lived. In 1967, rates of missed appointments were 4.8 per cent at the Tenderloin clinic, 2.0 per cent at the clinic in Chinatown, and 3.9 per cent at the Westside clinic. It is difficult to imagine that any patient-directed health behaviour interventions, other than hospital confinement, would have been nearly as effective. Furthermore, the decentralization of services, with its development of well co-ordinated treatment plans and the recognition that the treatment of tuberculosis took place within the context of other medical problems, socio-economic realities, cultural beliefs and practices, and emotional needs, no doubt resulted in better overall health care for individuals and the communities in which they lived.

In selected low-income countries, such as Pakistan and the Philippines, more than half, and frequently as many as three-quarters of patients with epilepsy are not in treatment (Desjarlais et al. 1995). Many of these patients are children and young people who started treatment but dropped out. (Drug treatment for epilepsy if begun in the first year of seizures will control seizures for two-thirds of patients after five years, and many of them need not use medications after that time period). This treatment gap is often blamed on behavioural variables such as low levels of health education, stigma, inappropriate use of alternative services, and family overprotection of patients. In a study in two extremely poor regions of China, Arthur and Joan Kleinman and their Chinese colleagues (Kleinman et al. 1995) showed that stigma and overprotection were indeed significant. But by far the most important obstacles to entering and staying in care were poverty and the cost (including the opportunity cost) of care. Of the families surveyed, many spent one-fourth of their household income on treatment services and related costs such as travel and missed farm work at critical periods. Yet local public health workers and physicians seemed to underestimate the significance of poverty and cost.

China's economic reforms have been associated with breakdown in rural health care in many areas, especially where populations are poorest and most remote. In such settings, structural changes that improve access to care and lower direct cost are among the most important public health responses to epilepsy, which in China affects more than four million people, three million of whom live in rural areas. These measures can be combined with health education programs aimed at reducing stigma, family education programs that seek to reduce overpopulation, and other health behaviour interventions. Indeed, it is the combination of health behaviour with structural changes (more clinics, lower cost of drugs, less waiting time, financial support for those in extreme poverty) that is likely to exert the greatest effect.

In conclusion, we find it startling, though not surprising, that destitute patients with tuberculosis in Haiti, homeless mentally ill persons in Skid Row, Los Angeles, and epilepsy patients in rural China are held accountable for their failure to follow medical regiments even though optimal access to care may not exist. For example, an editorial in *Chest* once declared that 'patient compliance' was 'the most serious remaining problem in the control of tuberculosis in the United States' (Addington 1979:741); and a psychiatrist who worked in Skid Row told us, while echoing the sentiments of many in the field (Bachrach 1984; Lamb 1991; Opler et al. 1994), that non-compliance with psychotropic medication regimens was a primary cause of homelessness among mentally ill persons. But such views fail to appreciate that, throughout the world and for a wide range of medical and psychiatric conditions, extreme poverty, structural violence, disability, or all three constrain patients' agency and shape health behaviour. If one accepts that those patients who are least likely to comply are those least able to comply, then one must accept the fact that the debate over the ethics of health-behaviour interventions, in many cases, is premature. Before that debate can take place, we must address the systemic, extra-personal forces that create barriers to care. And, before we can assess with any validity to what extent the attributes of individuals are prime causes of poor health outcomes, we should ask the questions: are poverty and relative powerlessness significant contributors? And if so, is there a local *modus operandi* that would facilitate efforts to combine structural changes with health-behaviour interventions to bring about increased levels of health for everyone in a community?

References

Addington, W. 1979. Patient compliance: the most serious remaining problem in the control of tuberculosis in the United States. *Chest* 76:741.

Bachrach, Leona L. 1984. The homeless mentally ill and mental health services: an analytical review of the literature. Pp. 11-53 in *The Homeless Mentally Ill: A Task Force Report of the American Psychiatric Association*, ed. H.R. Lamb. Washington DC: American Psychiatric Association.

Burnam, M. Audrey and Paul Koegel. 1991. New perspectives on the prevalence of specific psychiatric disorders among homeless adults. Paper presented at the 119th Annual Meeting of APHA. Atlanta, Georgia 10-14 November.

Centers for Disease Control and Prevention. 1990. Outbreak of multi-drug resistant tuberculosis - Texas, California and Pennsylvania. *Morbidity and Mortality Weekly Report* 39:369-372.

Cohen, Alex. 1993. Surrounded by horror: the lives of homeless mentally ill persons in the Skid Row area of Los Angeles. Ph.D. dissertation. University of California, Los Angeles.

Cohen, Alex and Paul Koegel. 1996. The influence of alcohol and drug use on the subsistence adaptation of homeless mentally ill persons. *Journal of Drug Issues* 26:219-243.

Curry, Francis J. 1968. Neighborhood clinics for more effective outpatient treatment of tuberculosis. *New England Journal of Medicine* 279:1262-1267.

Curry, Francis J. 1975. Encounters in training clinic support staff. *Chest* 68 (Supplement):462-465.

Desjarlais, Robert, Leon Eisenberg, Byron Good and Arthur Kleinman. 1995. World mental health: problems and priorities in low-income countries. New York: Oxford University Press.

Farmer, Paul. 1997. Social scientists and the new tuberculosis. *Social Science and Medicine* 44:347-358.

Goble, M., M. Iseman and L. Madsen. 1993. Treatment of 171 patients with pulmonary tuberculosis resistant to Isoniazid and Rifampin. *New England Journal of Medicine* 328:527-532.

Iseman, M. 1993. Treatment of multidrug-resistant tuberculosis. *New England Journal of Medicine* 329:784-791.

Kleinman, Arthur, Wen-zhi Wang, Shi-chuo Li, Xue-ming Cheng, Xiu-ying Dai, Kun-tun Li and Joan Kleinman. 1995. The social course of epilepsy in China. *New England Journal of Medicine* 40:1319-1330.

Koegel, Paul. 1987. Ethnographic perspectives on homeless and homeless mentally ill women. Rockville MD: National Institute of Mental Health.

Koegel, Paul. 1992. Through a different lens: an anthropological perspective on the homeless mentally ill. *Culture, Medicine and Psychiatry* 16:1-22.

Koegel, Paul, M. Audrey Burnam and Rodger K. Farr. 1988. The prevalence of specific psychiatric disorders among homeless individuals in the Inner City of Los Angeles. *Archives of General Psychiatry* 45:1085-1092.

Koegel, Paul, M. Audrey Burnam and Sally Morton. 1993. Enumerating homeless people: alternative strategies and their consequences. Paper presented at the 121st Annual Meeting of APHA, San Francisco, 24-28 October.

Lamb, H. Richard. 1991. The homeless mentally ill. *American Journal of Psychiatry* 148:691.

Opler, Lewis A., Carol L. Caton, M. Patrick Shrout, Boanerges Dominquez and Frederic I. Kass. 1994. Symptom profiles and homelessness in schizophrenia. *Journal of Nervous and Mental Disease* 182:174-178.

Research on alcohol use in native American populations

Stephen J. Kunitz

Department of Community and Preventive Medicine, University of Rochester School of Medicine and Dentistry, Rochester, N.Y., U.S.A.

The editor has asked an important question about the ethical issues raised by intervening in a way of life in order to benefit the health of all or part of a population. The ethical issue may be different if the public health problem being considered is perceived to be external to, rather than the result of the internal workings of, the culture itself. Clearly it is difficult to make absolute distinctions: most health problems are likely to be the result of forces both internal and external to a society. But to the degree that a condition is understood not to be integral to the culture and social structure of a community or society, dealing with it may be more or less problematic. For example, one usually does not encounter problems with immunization campaigns, for diseases like measles are likely to be viewed as conditions that happen to a society, not as conditions that are products of the very essence of the society. On the other hand, interfering in the practice of female circumcision may raise a host of difficulties as it means disrupting established practices and power relations within a society.

Most of my field experience has been with Navajo Indians, much of it around problems of alcohol use and abuse. This is an ambiguous condition. Clearly alcohol as a substance was introduced to Navajos by Europeans, and there is no doubt it is foreign to the culture. On the other hand, the way Navajos incorporated it into their culture in the late nineteenth and early twentieth centuries reflected many of their values and patterns of social organization (Levy and Kunitz 1974).

Alcohol was used in several different ways, most importantly in domestic groups of both men and women, and by groups of men at social functions. In the latter setting, men often drank to intoxication and sometimes suffered untoward consequences as a result, especially accidental injuries, some of which resulted in death. But because cash was scarce and distances were great, access was limited and excessive use resulting in discernible and measurable consequences at the population level were rare.

This began to change in the 1930s with the destruction of the livestock economy and growing involvement in wage labour and the cash economy. Change accelerated during World War II and afterwards as people moved from rural areas to reservation and off-reservation towns to be closer to jobs, services, and other attractions of urban life.

In this changing context, access to alcohol became much easier, and patterns of drinking that had not been particularly problematic in the past began to have measurable consequences in respect of morbidity and mortality. And it was in this context, too, that definitions of alcohol use began to change. No longer was it simply something that men did to excess on an occasional basis. Increasingly it was defined as pathological (Kunitz and Levy 1974).

The process of redefinition was encouraged by the infusion of millions of federal dollars into alcohol prevention and treatment programs, and the employment and treatment of more and more people, all of whom began to be educated to understand the phenomenon of alcohol use in new ways. By 1990 contract funds for health programs, mainly alcohol abuse, were the single largest item in the Navajo tribal government's budget (Kunitz and Levy 1994). As among other indigenous peoples, in the 1970s issues related to substance abuse became caught up in concerns about cultural identity, sovereignty, and self-determination (Brady 1995). Prevention and treatment programs began to be seen as vehicles for preserving and/or rediscovering traditional culture (Kunitz and Levy 1994).

The effect on anyone working on such problems, then, is not that alcohol abuse is off-limits, or that it is not seen as worthy of study. On the contrary, there is an incessant demand that the research be put to programmatic purposes. This is attractive for the investigator who finds that people actually seem to be interested in the work. The joy is not unalloyed, however, for at least two reasons. First, investigators have no line authority in any of the organizations that provide services. Thus one can only make recommendations, not implement programs. This is not in itself a problem unless one is criticized for the fact that no programs have been based upon the investigator's research findings.

Second, despite expressed interest, no institutionalized means exist to transmit findings to the relevant providers of services. Job turnover is so rapid that the personal contacts made during the course of a study are often disrupted by the time the research is done and the findings are available to be considered in the policy process. In the meantime, however, critics score political points by castigating investigators who, they say, grow rich and famous off the misery and misfortune of the people whose stories they collect and publish.

Returning to the point with which I began, because the problem of alcohol abuse is now defined as one that is both foreign to and destructive of the traditional culture, the ethical issues raised by the editor are not especially salient. Addressing the problem of alcohol abuse can be understood as protective of the culture, not destructive. In this situation the ethical issues are quite different: they involve not doing enough rather than doing too much, even as the institutional context makes it difficult to do much of anything.

References

Brady, M. 1995. Culture in treatment, culture as treatment: a critical appraisal of developments in addictions programs for indigenous North Americans and Australians. *Social Science and Medicine* 41:1487-1498.

Kunitz, S.J. and J.E. Levy. 1974. Changing ideas of alcohol use among Navajo Indians. *Quarterly Journal of Studies on Alcohol* 34:243-259.

Kunitz, S.J. and J.E. Levy. 1994. *Drinking Careers: A 25-year Follow-up of Three Navajo Populations*. New Haven: Yale University Press.

Levy, J.E. and S.J. Kunitz. 1974. *Indian Drinking: Navajo Practices and Anglo-American Theories.* New York: John Wiley and Sons, Inc.

The limits to health intervention

Lawrence A. Adeokun

Department of Demography and Social Statistics, Obafemi Awolowo University, Ile-Ife, Nigeria

Health interventions are aimed at modifying a sequence of health-affecting events which will produce unsatisfactory outcomes for the individual or the community, in the absence of those interventions. Such interventions are often based on proven scientific theories of what constitutes the right solution to a given health problem. In addition, health interventions can take the form of technological innovations and tangible inputs such as testing kits, vaccines and drugs. They can also take the form of intangibles such as information and education for behaviour change. The dilemma in the introduction of interventions is that those who proffer solutions are often not the same as those who are most seriously affected by the health problems. The ethical issues also arise when, as is often the case, the expected benefits can only be obtained at some cost to the individual or communities.

What makes HIV/AIDS interventions so contentious?

In the case of HIV/AIDS interventions, it is to the extent to which ‘ends and means’ are jointly predetermined by intervention providers and recipients, or that decisions are in the best interests of all parties, that those limits are set or shifted. There are three constituencies involved in most public health interventions: the affected individual, the community, and third parties who are indirectly affected by decisions taken by individuals or communities. Consequently, it is desirable to make a continuous evaluation of whose consent is needed and whose ‘pains and gains’ are being assessed in the determination of those limits.

Prevention and control issues

Control of sexual contacts

Early in the AIDS epidemic, the proof of the sexual origin of the infection formed the basis of the Cuban program of isolation of HIV+ individuals as a means of regulating their sexual life, and preventing the transmission of the virus. That the isolation policy may have contributed to the slowing of the epidemic in Cuba can be seen as a benefit for the country obtained at a high cost to the individual (De La Concepcion 1993). While such a drastic measure may be practical in the island-nation of Cuba, it is hardly applicable in Uganda, with its porous territorial boundaries. It is an unfortunate coincidence that Cuba has a system of government that may have made the measure much more enforceable. Unfortunate, because it clouds the debate on the relevance of similar measures in other societies where the inescapable dynamics of the epidemic may have made limited isolation of infected individuals, or a tight control of undesirable sexual contacts, a viable early intervention. The ethical justification for such control measures is that the earlier they are effected, the fewer the individual liberties which are traded for the common good. An earlier attention to this logic should have informed an earlier control of sex-tourism in Sri Lanka, and some other Asian countries, than has been the case.

Mass screening, and test result notification

The ethical issues raised by blood testing and result notification policies arise from the fact that tested individuals are often responsible for the current or future serological status of third parties, such as their sexual partners or unborn children. Consequently, the case for the confidentiality of testing and notification of results is not as clear-cut as it may first appear (see Guidetti et al. 1993).

Mass screening has played a limited role in the control of the spread of HIV, and of vertical transmission in particular, because mass screening is considered inappropriate and unethical, given the inability of most health systems to cope with the social and medical implications of the information provided by such screening. When individuals are tested, there is a moral reluctance to share the test results with third parties who may have a stake in the knowledge. This is particularly true of discordant couples. The extension of that confidentiality to the test results of prostitutes also raises agonizing questions of the right of the patrons to know the particular risks they face in given sexual contacts.

Another ethical issue is raised by the timing of tests in females, if the chances of vertical transmission are to be significantly influenced. In developing countries, there are three critical points for such tests during the reproductive span: before marriage, at maternal clinic contacts, and at selective screening exercises. For a discerning few, the prospects of entry into marriage without knowledge of the HIV status of the partner is inconceivable. The number of couples who soon fall ill and die within a short period of their wedding in a country like Uganda is sending a strong signal of the need to know the serological status of marriage partners.

The next opportunity for HIV testing could be when and if people make contacts with the modern antenatal services. In Uganda such antenatal HIV testing is only available on request in government hospitals which serve large populations. In contrast, some of the private hospitals provide routine testing for antenatal clients as a precaution against management of subsequent complications. Given the key role that such testing plays in the prevention or management of vertical transmission in the West (Read et al. 1992; Scherphier et al. 1992), it appears negligent to deny the introduction, or avoid patronage of such screening programs.

The third test opportunity is at selective screening exercises such as pre-operative testing or blood donation related testing. This is the only option available to males in most developing countries, irrespective of the HIV prevalence levels. Given the greater chances of male-to-female than female-to-male transmission of infection, it is a pressing public health need to establish equal opportunities for the testing of the sexes. Even for women, antenatal care coverage varies between and within countries from a quarter of all pregnant women in Morocco to nearly all pregnant women in Trinidad (Jacobson 1991).

In developed countries, the strategy for minimizing the chances of vertical transmission takes the form of administering tests at four points surrounding the initiation and carrying of a pregnancy: pre-pregnancy testing can form the basis of becoming or not becoming pregnant; testing during pregnancy helps to determine maternal HIV-status and the chances of intra-uterine transmission; perinatal testing allows estimation of the chances of the infant being infected; and postpartum testing helps to establish the serological status of an infant born to a known HIV+ mother (Miles 1992). This situation represents an ideal to which the developing countries can aspire. Poor health infrastructure prevents the attainment of this ideal and is, in effect, a circumstantial constraint on the ethical implementation of health interventions.

Breastfeeding and vertical transmission

In spite of the link between breastmilk and vertical transmission of HIV, there is a program of popularization of breastfeeding in the developing countries. It is the considered opinion of international organizations that the benefits of prolonged breastfeeding far outweigh the risks of vertical transmission by HIV+ mothers. Such a position illustrates the complications which arise from the decision-making powers of such organizations, as well as from the time-lag between the establishment of new scientific facts and modification of preventive measures in developing countries.

The weight of the scientific evidence can be summarized in the following terms: the estimate of the transmission rate in studies of breastfeeding infants is currently between 14 and 27 per cent with the possibility of upward revision as the technology for the monitoring of viral artefacts in breastmilk improves (Hom et al. 1992; Thomas et al. 1992); weaning of infants of HIV+ mothers has been shown as an effective strategy for reducing perinatal transmission (Kuznetsova et al. 1992); and there is a high HIVDNA expression in breastmilk very soon after parturition (Ruff et al. 1992).

It is, therefore, alarming that the common good of prolonged breastfeeding is summarily imposed on whole populations. The fact that the populations may be unaware of the risks, or if aware, may be unable to make an informed assessment of the chances they are taking in breastfeeding, does not reduce the unease raised by these international decision-making processes. There is a case to be made that the scientific evidence is not compatible with an undifferentiated popularization of breast feeding. In any case, the ability of the care-givers to make a full explanation of the phenomenon to patients as a basis of informed consent, is often constrained by the inability of local languages to cope with the range of issues raised by the epidemic. The gap in communication is, however, compensated by the degree of ‘trust’ by the patient in the good judgement and infallibility of the care-giver. What has happened in the AIDS epidemic is that side-effects, toxicity, and failure of drugs to deliver on the promises of a cure, have eroded that trust.

Therapeutic measures

Vaccine and drug development

The absence of indigenous vaccine and drug development capacity in developing countries reduces the ability of such countries to influence the testing and costing policies (Bora et al. 1993; Costa et al. 1993). The objectives of immunotherapy are served in a number of ways. These include the inhibition of HIV replication (Calio et al. 1992); and the use of drugs that decrease the Tumour Necrosis Factor and which in addition decrease HIV replication (Dezube et al. 1992). Whatever the approach, one of the major concerns with immunotherapy is the adverse side-effects of some of the drugs. Another emerging concern is that the trial of these technologies poses ethical, policy and other problems for programs in developing countries (Mugerwa 1992).

The high cost of drugs and therapies

The fact that most of the research and development and production capacities are in private hands limits the ‘humanitarian’ or ‘philanthropic’ inter-governmental rationale for the distribution of drugs and health techniques which have been so effective in the management of earlier world epidemics. The predominance of the profit motive, therefore, determines the cost of drugs. Current estimates of the average yearly cost of treatment for a person with AIDS in various countries and regions range from $38,000 for the USA (Hellinger 1992) to between $26,000 and $32,000 in the OECD countries and to less than $400 in Africa. The general rule that the annual in-patient and out-patient care cost for people with AIDS approximates the per capita GNP (Cameron and Tarantola 1992) also gives an indication of the magnitude of the direct costs of care to patients and their families.

Although patients in developing countries can rely on the extended family resources in an emergency, such reliance draws other persons into setting the priorities of the patient in complying with medical advice and directives. A husband has the final say in most reproductive health decisions in developing countries. The knowledge base of the husband, as well as his pride and personal interests, can often take precedence over the well-being of the wife and the child in deciding what items of scarce financial and other resources should be used. A further complication is that the rapid collapse of the family support system in the epidemic reduces the chances of the help given to AIDS sufferers ever being reciprocated.

Limited successes of HIV/AIDS interventions

Against the background of the discussion so far, the limited success which has been recorded in reducing the rate of infection in Uganda (BBC 1997), derives from information, education and communication (IEC) factors. In contrast the 12 per cent decline in AIDS deaths over the period of a year reported in the USA and 25 per cent in France were the outcome of better treatment of AIDS-related conditions and access to the most effective modern techniques for the control of the progress of HIV infection to the AIDS-related and AIDS stages.

Conclusion

If there is any one lesson from the difficulties in setting the limits of health interventions in developing countries, it is the need to pay attention to the power relations between the possessors of the truths of health transition (see Legge 1995) on which the medical interventions are based, and the hapless beneficiaries of those interventions. The AIDS epidemic at least brings to the fore some of the crude power and economic relationships underlying the application of ethical standards to developing countries. A caveat is that the blame is not only on one side: instances of limited effectiveness and loss of faith in Western medicine; the combination of modern and traditional treatment; and fundamental problems of beliefs about the causes of ill health, further complicate the determination of limits of interventions.

References

Bora et al. 1993. Ethics of basic bio-medical research in developing countries. Eighth International Conference on AIDS, Amsterdam, 20-23 July 1992 (Abstracts).

British Broadcasting Corporation (BBC). 1997. Focus on Africa. 27 February.

Calio, R. et al. Modulation of immune functions by anti-HIV nucleoside analogues. TuA 0522.

Cameron, C. and D. Tarantola. 1992. The costs of AIDS care in the world, 1990. WeC 1038.

Costa et al. 1993. The ethics of anti-HIV vaccine researches: contribution from people living with AIDS. Eighth International Conference on AIDS, Amsterdam, 20-23 July 1992 (Abstracts).

De La Concepcion. 1993. Ambulatory care system for Cuban HIV-positives. Paper presented at Ninth International Conference on AIDS, Tokyo.

Dezube, B.J. et al. 1992. Pentoxifyline (Trental) decreases tumor necrosis factor (TNF) and HIV replication in patients with AIDS. MoB 0019.

Filho et al. 1993. Ethical issues in preventive HIV vaccine trials in Brazil. Paper presented at Ninth International Conference on AIDS, Tokyo.

Guidetti et al. 1993. Ethics and medico-legal problems in HIV seropositivity communication. Paper presented at Ninth International Conference on AIDS, Tokyo.

Hellinger, F.J. 1992. Forecasts of the costs of medical care for persons with HIV: 1992-1995. *Inquiry* 29,3:356-65.

Hom, D. et al. 1992. Natural history of HIV infection in Ugandan infants. WeC 1058.

Jacobson, Jodi L. 1991. *Women's Reproductive Health: The Silent Emergency*, Worldwatch Paper 102, Women's reproductive health: the silent emergency. Washington DC: Worldwatch Institute.

Kuznetsova, I.I. et al. 1992. Prevention of maternal-infant HIV-transmission by weaning. ThC 1522.

Legge, David. 1995. Research to support partnerships for public health. *Health Transition Review* 5,2:223-227.

Miles, S.A. 1992. Early detection of HIV-1 in infants of seropositive mothers by acid dissociated HIV p24 antigen. TuB 0512.

Mugerwa, R.D. 1992. The challenge posed by collaborative HIV vaccine trials in developing countries. TuB 0565.

Read, S. et al. 1992. Markers of HIV vertical transmission. PoC 4230.

Ruff, Andrea et al. 1992. Prevalence of HIV in breast milk and correlation with maternal-infant transmission. ThC 11523.

Scherphier, H.J. et al. 1992. Prognostic factors for vertical HIV transmission. PoC 4231.

Thomas, P. et al. 1992. Maternal predictors of perinatal HIV transmission. WeC 1059.

The limits to health intervention

Elisha P. Renne

Office of Population Research, Princeton University, Princeton NJ

Interventions intended to improve health are complicated by the ethical question of what to do when these interventions interfere with local cultural practices and beliefs. There are several possible approaches to the problems although they tend to presume interventions that counter practices and beliefs that individuals themselves can change (e.g. that pregnant women can stop smoking). The example that follows considers a slightly different aspect of this question, namely, what is the range of appropriate options for outside groups and concerned public health professionals when local health personnel are themselves the ones obstructing an intervention? While this example is complicated by legal and political issues of national sovereignty, the question remains as to what ethically can be done to facilitate a health intervention when societal practices (e.g. forms of patron-clientage, private use of public funds) lead health workers to undermine this process. The example to be considered is that of the 1996 cerebrospinal meningitis (CSM) epidemic in northern Nigeria (Court 1996; Médecins sans frontières 1996; WHO 1996). In this case, there was no need to change individual patients' behaviour since people willingly went for immunization and treatment. Rather, it was individuals in the public health care sector who sometimes prevented timely and effective prophylaxis and treatment during the height of the epidemic. The question of intervention is relevant here both for public health professionals within Nigeria and for health organizations such as WHO and Médecins sans frontières (MSF), both of which had a role in providing and administering CSM vaccines as well as in monitoring the course of the epidemic during the period from January to May 1996 (MSF 1996:43; WHO 1996:80). The following incident, described by public health personnel from Ahmadu Bello University Teaching Hospital, Zaria, illustrates the particular ethical questions involved.

An outbreak of cerebrospinal meningitis in northern Kaduna State

On January 18, 1996, the head of one village in a rural area of northern Kaduna State sent word through a sociologist from Ahmadu Bello University (ABU), Zaria, who was working there, that assistance was needed in what appeared to be an outbreak of cerebrospinal meningitis, nine cases of which were reported. By the time a nurse and the registrar from the Department of Community Medicine, ABU-Zaria, arrived in the village three days later, four people had died and the other five had been treated and discharged from the local general hospital. In the following week, village heads from three other villages in the area came to the local health centre to report outbreaks of CSM in their villages.

During the last week of January 1996, the local government medical unit head was briefed by ABU Department of Community Medicine staff about the rising number of cases of cerebrospinal meningitis being reported in the local government area. He was informed of the need for the adequate provision of CSM vaccines and of the relevant drugs and other materials required to contain the outbreak. The man responded by saying that the local government had neither vaccines nor drugs. Instead, he advised them to give the villagers water injections in place of vaccines for 'psychological satisfaction'.

By 7 February 1996, nineteen villages reported cases, yet no drugs or vaccines were forthcoming from the local government. One village head approached the staff of the one local health centre, offering to purchase drugs and vaccines to treat cases in his village. Initially, the ABU medical officer in charge of the centre refused, saying that he did not want to get involved in local politics, that is, go over the authority of the local government medical unit head. Eventually the officer did purchase five vials of CSM vaccine at a cost of N2,500, paid for by the village head, which were subsequently administered by local health centre staff. By mid-February 1996, local government health centres had received allotments of CSM vaccines supplied by the Kaduna State Ministry of Health which were administered soon after.

Discussion

This incident raises the ethical question of how to put pressure on the local government medical unit head to intervene in a health crisis while at the same time not completely undermining the public health system, imperfect though it may be. In this case, a village head went over the authority of local health centre personnel by asking ABU Department of Community Health staffers to obtain CSM vaccine for his village. Apparently both he and the

Department of Community Medicine personnel concluded that the urgent need to vaccinate villagers justified going around slow-moving local government health officials. The ethical question here is to decide how outside interventions can be made which help to reactivate a public health system that has essentially been gutted through government spending cuts, infrastructural decay, and poorly paid staff. How does one balance the short- and long-term interests of Nigerian citizens?

These questions lead to more complex ethical questions concerning government health spending, development policies, and international aid. One also needs to consider these local cases in the context of broader economic reform programs. For example, the implementation of user fees as a method of medical cost recovery in public health care (World Bank 1994:155), along with concurrent demands for currency devaluation and unwieldy debt service payments (Cornia, Jolly and Steward 1987), have contributed to a situation where 'for many Nigerians private medicine is now the only source of Western biomedicine' (Alubo 1990:306). As an editorial in *The Lancet* (1990:886) has observed:

> The evidence is far from conclusive about the feasibility of introducing charges for health and education without lowering utilisation of these services… Moreover, it is questionable, in the current African context of underpaid health workers, widespread corruption, and decline purchasing power, that such charges could generate sufficient revenue to finance social service improvements or expand access to the underserved people in Africa's rural periphery.

The Lancet's gloomy assessment of the future of public health care in Africa is seconded by Alubo (1990:320) who sees the private health care sector in Nigeria eventually 'eclipsing… the beleaguered public medical system'. However, the privatization of public health care in Nigeria raises two problems with respect to the prevention and treatment of cerebrospinal meningitis outbreaks. First, how will health care for the poor be provided? And second, how will epidemics be controlled and monitored without a public health care system? The example of the CSM epidemic in northern Kaduna State offers some insights, if not answers, in addressing these questions.

In considering the appropriateness of health interventions for local cultures and practices, one needs to consider the political economic context in which individuals, be they local health workers or villagers, behave. In the northern Kaduna State example, the recalcitrant (and cynical) local government medical unit head had his own interests which, given the current state of the Nigerian economy, are unlikely to be replaced by an altruistic vision of health care in the near future. The village head who was able to get vaccines for his village through ABU medical personnel did so by going over the heads of local health officials. Yet despite the different interests and opposing actions of these two men, the village intervention apparently helped put pressure on local health officials, who did take action, even it if was late and insufficient (Ejembi et al. n.d.). This situation suggests that an appropriate health intervention in this case might be one in which local village leaders work with university-based public health practitioners, state health officials, or international NGO personnel, both to address community health problems and to put pressure on local government health officials. This approach has the benefit of incorporating community-based concerns into health interventions as well as strengthening local health care monitoring. At the same time, such an approach would operate within the public health care system yet would correct some of its excesses. While it may be difficult to balance the desire to intervene in an effective manner with the need to improve local public health services, health interventions sponsored by international non-government organizations or spearheaded by national health practitioners need to take these twin concerns into account. Short-term interventions that undermine the workings of the public health system may ultimately be of questionable benefit. While the behaviour of local government health care workers is unlikely to change under current economic conditions (see Van der Geest 1982), health intervention that both motivates community health care self-help and puts pressure on local health officials may be one means by which cerebrospinal meningitis outbreaks can be contained and other public health interventions ethically implemented.

References

Alubo, S.O. 1990. Doctoring as business: a study of entrepreneurial medicine in Nigeria. *Medical Anthropology* 12:305-324.

Cornia, G., R. Jolly and F. Steward (eds.). 1987. *Adjustment with a Human Face*. Oxford: Clarendon Press.

Court, C. 1996. Meningitis epidemic sweeps northern Nigeria. *British Medical Journal* 312:598.

Ejembi C., E. Renne and H. Adamu. n.d. The politics of the 1996 cerebrospinal meningitis epidemic in Nigeria. Unpublished paper.

Lancet. 1990. Editorial: structural adjustment and health in Africa. 335:885-886.

Médecins sans Frontières (MSF). 1996. *Activity Report: July 1996-July 1996*. Brussels.

Van der Geest, S. 1982. The efficiency of inefficiency: medicine distribution in south Cameroon. *Social Science and Medicine* 16:2145-2153.

World Bank. 1994. *Better Health in Africa*. Washington DC.

World Health Organization (WHO). 1996. Cerebrospinal meningitis, Nigeria. *Weekly Epidemiological Record* 71,10:80.

Stretching the limits of health interventions in Burkina Faso *

Sally Findley, Ahmed Zayan, Maria Kere, Youssof Kone, and Gaston Sogbo

Many health programs in developing countries share the common goals of reducing infant and child mortality. But there is no consensus on the most effective way to attain these goals.

After regarding the historical evidence, some contend that improvements in child survival are most strongly associated with a wide range of social and cultural changes, such as changes in attitudes to child rearing, in expectations regarding future support for parents from children, and in women's expectations for themselves and for their children, often stimulated as part of the literacy revolution (Ewbank and Preston 1990; Basu and Basu 1991; Caldwell 1979, 1986). Of all the social factors associated with child mortality reductions, maternal education, specifically literacy, has been singled out as one of the most important. In studies conducted in diverse locations such as Bangladesh, India, Mexico, Nigeria, and Zambia, strong correlations have been found between maternal education and child mortality (Lindenbaum 1990; Jain 1994; LeVine et al. 1994). From the findings of these researchers, public health practitioners have advocated child health programs that are implemented in combination with a range of developmental interventions that will stimulate the kinds of social and cultural change believed to be the key to facilitating changes in health attitudes and behaviour.

While not discounting the effect of social factors such as maternal education, others demonstrate the importance of access to health care services (Omorodion 1993; Caldwell 1994). In Nepal, a key factor associated with health status was the use of modern health services, which in turn was correlated with proximity to a road and knowledge of a health care worker (Niraula 1994). Recent debates about reversals of the health transition in the Soviet Union and newly independent states focus on the deleterious effect of the disintegration of the health system (Barr and Field 1996). Accordingly, some advocate strengthening the availability of primary health care in the areas of high child mortality.

Of course, it is very difficult to isolate the effect of health care interventions, independent of educational or public health interventions. Often it happens that improved primary health care programs are implemented in the context of significant economic and social changes, as in Pebley and Amin's (1991) study of Ludhiana district, India. Even if the program's effect on mortality is assessed separately for each category of villages (with different health and non-health components), overlaid on these changes are those of the broader societal development, which can additionally and differentially affect program implementation and assessments. Indeed in their study, they find that overall child mortality rates declined at an equal pace across all combinations of program implementation. However, they do note significant differences in gender-specific mortality. They attribute the narrowing of the sex differential in child mortality to the effect of health education on the family's traditional system for allocating health and nutrition resources preferentially to males. Thus, the net effect of the program depends on the interaction with cultural and social values.

---

*The authors gratefully acknowledge the contributions of the entire staff of Save the Children/Burkina to the development and success of the program described here. Without their efforts, we would have nothing to communicate. We also would like to acknowledge the support for the work from the US Agency for International Development, through its child survival grant to the Burkina program. Finally, we thank David Marsh and Save the Children/US, for their co-operation, enthusiastic support for the project and for the permission to publish the results in this journal.

The other factor to consider is the sensitivity of health behaviour to socio-economic or community development inputs. When the behaviour is complex or requires the presence of several complementary factors (e.g. money with which to buy medications, visit of the vaccination team, retention of a sequence of instructions for health care), the more complex kinds of behaviour are likely to be adopted in the situations where the appropriate factors exist to facilitate adoption. Although the cultural orientation to the behaviour may be identical across all program zones, the health interventions will not work as well where there are factors which counteract or offset the possibilities generated by the health program. For example, bringing a child for vaccinations when the mobile team visits requires that the team comes on time, that parents are notified of the visit in advance, and that they can free themselves to bring children for the team visit. The more isolated neighbourhoods may not be informed in time, those with poor road access may find it impossible to get to the team on the specified day, or the parents may not be able to interrupt the critical sequence of harvesting activities. On the other hand, if parents can mix their own sugar-salt solution, they can treat their children's diarrhoea whenever it happens, regardless of their distant location, poor roads, or other constraints.

For this reason, when evaluating the effect of health and non-health interventions, it is important to include a range of program types and behavioural changes. If there are differences in the adoption of behaviour associated with specific contextual variations, this will suggest the need to consider how susceptible particular kinds of behaviour are to specific program features that vary at each site.

The program in Burkina Faso offers the possibility of controlling for different combinations of program activities. In this project, developed by Save the Children/US, an integrated child health program was implemented in all villages, and in about two-thirds of them a specified combination of other programs was implemented. Further, the child health promotion project targeted a variety of health behaviour and outcomes, giving the necessary opportunity to assess the sensitivity of particular kinds of behaviour to variations in the program and developmental context.

Study area

The project area on which this paper focuses is the Sapone district of Bazega province, 30 kilometres south of Ouagadougou, the capital of Burkina Faso. This area is typical of the savannah area which constitutes the settled area of the Sahel. The area is dominated by subsistence agriculture, with the major cash crop being cotton. During the rainy season, people raise millet, sorghum, peanuts, beans, and vegetables. People live in villages, which are characterized by several different neighbourhoods, with the cultivated area extending beyond the village clusters. Despite the proximity to Ouagadougou, the villages are not served by electricity, and few have modern deep wells.

Although a few non-governmental organizations are working with Sapone district villagers, this paper focuses on the project organized by Save the Children/US. The program works with villagers to implement small-scale, low-cost community development projects according to the village's priorities. In all projects, the program's major inputs are to facilitate a discussion of possible improvement activities that the village might undertake, and then, having established the priorities, to train the villagers in the skills needed in accomplishing the activities. Materials used are locally manufactured or purchased by the villagers. Many of the villages have chosen to develop their cotton production, the major cash crop of the area. Other community development activities include village well construction, group guaranteed lending and savings , vegetable gardens and irrigated cereal production, and literacy training in village schools.

Since 1988, health components have been added to the projects in all villages encompassed by the project. The first health component focused on raising child immunization coverage. In 1992 a major child survival program was implemented. More importantly for the present paper, the health components were extended to villages which had not yet undertaken any community development activities. By 1993, the program had been implemented in 26 villages, reaching a population of 25,670, with 5,693 women of childbearing age and 4,859 children under the age of five.

The project adheres to a self-help philosophy. The village, through its extant committee structure, discusses its priorities and undertakes the activities it chooses. Any activity depends on the labour and material contributions of the villagers. The key input of the FDC is training, to enable the villagers to carry out their chosen activities. In the health programs, the project relies on a team of local women who have been trained as health motivators. The motivators conduct educational sessions on a variety of health promotion activities, such as use of simple salt solutions, and cleaning underbrush to reduce mosquito breeding grounds. They extend their activities by training local health committees, local volunteer health workers, and midwives in health promotion activities.

The project also has a strong self-evaluation orientation. Before commencing any health promotion activities, the project started with a village census to establish the situation at the start of the project. This census is updated annually, with regular monthly updates to vital statistics. The monitoring system includes several of the project inputs, making it possible to monitor program activities and outcomes.

The health intervention

The child health promotion project of Sapone targeted several activities associated with improvements in child survival: administration of oral rehydration therapy, immunization of children and women, adoption of improved maternal and child nutritional practices, prenatal consultations and adoption of birth control for birth spacing, and control of malaria. The project provided no actual medical services, but emphasized the training of local health workers to educate, counsel and refer the villagers. While the local health workers were trained to distribute essential medications, this was a minor element of the program. The project's main contribution was training and supervision of newly trained residents.

The key to the project's success was recruitment and training of people from the district to work as village health motivators. They educate and motivate village health committee members and village health volunteers who in turn educate and mobilize village parents. The village health motivators each are assigned 3-4 villages where they go bi-weekly to conduct educational sessions for villagers, train and mobilize the volunteers, conduct growth monitoring, and distribute medications such as chloroquine to the person in charge of the village drug supply.

In two-thirds of the villages, the health training is complemented by the introduction of self-help development programs, including well construction, village-based credit and savings, gardening and other farming changes, and adult literacy. For each of these programs, the project outreach staff help create a village committee to determine the village needs, to develop a plan for addressing the needs, and then to build the necessary service structure. The village is responsible for all the inputs and labour required for any construction projects, such as digging a well or building a school.

As with the health activities the project staff concentrate on education and training. Because the non-health sector programs are implemented at the request of the village, each village may have a different combination of programs. Table 1 outlines the different combinations found among the 26 villages.

Table 1
Distribution of villages by program mix

Program mix	No. villages	Mid-project population	Crude death rate
Health only	5	5905	16.8
Health & literacy	3	2122	16.5
Health & non-education	3	3721	18.8
Health & literacy & 1	6	7731	17.9
Health & literacy & 2	6	4381	17.1
Health & 2 non Lit.	3	2261	17.7

Only five of the 26 villages had only health programs. In six villages health programs were complemented by only one other program. Establishment of literacy programs and village schools is the most common choice for a complementary program, both when only one additional activity is selected by the village and when more than one are selected. In 15 villages (over half of all villages) the program mix includes literacy programs. In most cases, the literacy programs are further complemented by other developmental activities, usually village wells and small-scale credit programs. In only three cases were two complementary programs implemented when literacy was not included.

Program evaluation

The health programs were implemented for four years (1992-1996), with good baseline data for 1993-1996. Some of the non-health programs pre-date the health interventions, while others do not. The project activities were monitored regularly with on-site supervision and the submission of quarterly reports by staff.

In addition, a locally introduced and managed health information system generated the data needed to evaluate changes in health outcomes. Before implementing any program, the project organizers conducted a complete census and identified all women of childbearing age in the 26 villages. In each village, a specially trained ‘registrar’ received information from co-villagers regarding all vital events: births, deaths, marriages, migrations and moves. These were recorded in a simple notebook and then verified by the village health motivator with a home visit at the time of her regular bi-weekly visit. Verified events were computerized at the program office in Sapone. Data from February 1994, 1995, and 1996 are used in this paper.

The project was evaluated in 1996 using several different methods. The first set of data was obtained from the project's own monitoring system. This system provided information on vital events, immunizations, pregnancies, and selected indicators for vitamin consumption. The second set of data was obtained from household surveys conducted in 1994 and again in 1996, of approximately 200 randomly selected women age 13-49 years with a child under two years. They were selected in batches of seven from each village, with two batches selected in the larger villages. The surveys were conducted by interviewers trained from among the group of village health motivators and village registrars. The surveys included questions about knowledge and adoption of the child health care practices promoted by the village health motivators.

The third set of data for the evaluation of the project came from qualitative interviews and focus groups conducted in 1996. The focus groups were conducted with the village health volunteers, local health committees, and with a group of village men. The focus group questions, developed with the entire staff of the project, solicited points of view on the most beneficial activities of the project, those most beneficial to family health and to their level of living, the difficulties they encountered in adopting the suggested behaviour, and their suggestions regarding actions or advice for further improvements of the program.

Because of the particular interest in determining the effect of the health interventions with and without the multisectoral complementary activities, the evaluation was structured to allow a comparison of findings in projects with only health programs versus those with multisectoral activities. Focus groups were conducted in villages with and without complementary activities (two sets of groups in each category of village). Focus groups were conducted by moderators trained from among the group of village health motivators. Discussions were held in the Moore[2] language and recorded in French by village health motivators serving as observers. No village health motivator conducted focus groups in any of the villages for which she was responsible.

Findings

As seen in Table 2 there were remarkable reductions in infant and child mortality during the three-year project period. For the baseline, figures refer to February 1994 for the original 18 'early starter' villages where the project was started. For villages added the following year (the late starters), the baseline refers to February 1995. Thus, it is possible to make comparisons between the groups for comparable program durations. For both early and late starters, the changes in infant and child mortality are reported by health and developmental program mix.

Table 2
Change in infant and child mortality, 1994-1996 by village program mix

Village category	IMR baseline	IMR final	CMR baseline	CMR final	% decline in IMR all villages
n=18 (1994)	139	70	54	35	50
n=8 (1995)	91	68	69	34	25
n=26	135	69	55	35	47
Villages with 2+ programs					
n=13 (1994)	136	52	50	25	62
n=2 (1995)	120	36	81	18	70
n=15	133	49	53	24	63
Villages with <2 programs					
n=5 (1994)	148	136	68	52	8
n=6 (1995)	49	107	53	40	+118
n=11	85	117	59	24	+37

Despite the short period for observing the effect of the program on mortality, it is clear that this was significant. Infant mortality declined from 139 to 70, a 50 per cent reduction. The child mortality rate (deaths to children under age 5) went from 54 to 35, a 35 per cent reduction. The second set of figures in Table 2 shows that the largest reductions in infant and child mortality occurred for the villages with two or more developmental interventions. In these villages, infant mortality declined from 136 to 49, a drop of 63 per cent. The two villages which were added to the program a year later actually had a slightly higher drop for the shorter observation period (a 70% decline). Child mortality rates also were halved, from 53 to 24. The child mortality decline was comparable in the early and later starting villages.

In contrast, the third set of figures in Table 2 highlights the much smaller reductions in infant and child mortality for the programs implemented in the villages with only one or no

---

[2] Mossi, Molé, Moshi.

developmental activity. In these eleven villages, infant mortality actually rose from 85 to 117. Part of the reason for the increase is the presence of two villages which reported no infant deaths for the baseline year. The absence of deaths was rechecked only in 1996, so it is possible that there might have been some missed deaths, but none were found unreported in 1996. The two villages with no reported deaths were both later starting villages, and if we look at the figures for the early starters only, we observe a drop of only eight per cent, from 148 to 136. In the eleven villages with only health interventions, child mortality dropped from 59 to 24, a decline of 59 per cent.

If we consider only the contrast for villages which had the full three years of interventions (1993-1996), we eliminate the difficulty of comparing results for varying periods of intervention. These figures are the first ones reported in each panel of Table 2. The infant and child mortality reductions for the 13 villages with multisectoral programs are significantly higher than those observed in the villages with one or no non-health programs. Infant mortality declined by 62 per cent from 136 to 52 in the former villages, a difference which is significant at the .000 level (Chi-Square = 41.4). It declined by only eight per cent in the group with only one or no complementary intervention. This change in infant mortality is not significant (Chi-Square = 0.59). The change in infant mortality was also significantly greater in the former than the latter group (Chi-Square = 28.8). Finally, the 52 per cent reduction in child mortality for the villages with two or more complementary interventions was significant (Chi-Square = 8.62), while the child mortality reduction of 25 per cent for the villages with no or only one developmental intervention was not significant (Chi-Square = 2.2).

While the results cover only a small time period when program effects on mortality are usually not expected to occur, there is nonetheless evidence of a significant reduction in the villages with multisectoral interventions. It would be nice to be able to further disaggregate the study findings by type of developmental intervention, but unfortunately the number of villages involved and the different durations of program implementation do not permit a more detailed breakdown. In the next section of the paper we explore the behavioural and attitudinal changes that accompanied these different mortality reductions.

Survey responses on changes in behaviour in all the villages

Behaviour and attitudinal surveys conducted in the second program year and at the end of the program covered key child health promotion practices, including those related to reduction in diarrhoea, feeding during weaning, participation in growth monitoring, behaviour to avoid high-risk births, and child vaccinations. The surveys show an increase in health promotion behaviour across the entire program area. The following table documents the increase observed in this behaviour, at the start of program implementation and then after three years of operation.

Table 3
Behavioural and knowledge changes, 1993-1996

Objectives	Achievements	Before program %	After program %
Reduction in diarrhoea			
	Knows to give fluids	20	73
	Knows to breastfeed more	15	60
	Knows to give more soft food	6	47
	Uses ORS or SSS	33	92
Supplemental feeding at weaning			
	Knows to start porridge at 4-6 months	60	80
	Knows to give simple porridge without fat	58	79
	Knows what weaning foods to give	7	96
Participation in growth monitoring			
	Has a growth chart	75	99
	Had child weighed	30	76
High-risk births and STDs			
	Knows need for 3+ prenatal consultations	65	88
	Knows to have first consult. in trimester 1	42	82
	Had no prenatal consult. for last pregnancy	72	6
	Women having two or more prenatal consultations	12	68
	Wants to space next birth	69	83
	Uses modern contraceptives	45	48
Vaccinations			
	Child completely vaccinated	69	89
	Proportion women with 2+ anti-tetanus vacc.	97	98
N		240	210

The surveys show substantial adoption of recommended behaviour. The health promotion practices became almost commonplace among the population served by the programs. The mothers also registered substantial improvements in their understanding of factors promoting child health.

Because of small sample sizes in each village, we were not able to report the change in behaviour separately for each group of villages. However, we did conduct focus groups in each group of villages, and these interviews clearly show a difference in attitudes and behaviour in the two groups of villages.

The mothers clearly knew much more about the appropriate treatment of diarrhoea than they had at the commencement of the program activities. As seen above, the proportions knowing to give fluids, to give soft food, and to breastfeed more increased by about 3-4 times for each practice. At the end of the program activities, over half of the mothers knew these treatments for diarrhoea, compared to less than one in ten at the beginning. The mothers' knowledge is matched by their behaviour. Before the implementation of the health programs, only 33 per cent of the mothers knew to give sugar-salt-solution (SSS) to a child; at the end of the program almost all mothers knew this (92%).

More modest improvements in knowledge were reported for use of supplemental feeding to be given while weaning a child. At the start of the program, only seven per cent knew what weaning foods to give. After three years of nutrition demonstrations and village nutrition education sessions 96 per cent of the women reported knowledge of at least one weaning food. The proportion knowing what type of porridge (without fat) and when to give the porridge rose from 60 to 80 per cent. At the end of the program, 99 per cent of the mothers of two-year-olds reported having a growth chart and 76 per cent reported having their child weighed. This corresponds to program statistics which show a dramatic increase in the number of children weighed on regular village health motivator visits.

In both categories of villages where focus groups were conducted, the men and women were well aware of the changes in health of their children and the contribution from their own activities. Women said the following:

> The health advice clarified much for us about how to raise and nourish children. Before we took care of children almost by chance. The educational sessions on diarrhoea have helped us better manage health problems.

> Now I know what to do when my child is sick with diarrhoea.

> The sessions on diarrhoea have helped us a lot. I had experience myself two times with diarrhoea, when using the packets stopped the diarrhoea.

> We now know how to take care of our children with different porridges, because mother's milk is not enough.

The village health committee observed the effect of this on mortality:

> We rapidly treat the little illnesses of our children and then we avoid the bigger illnesses and the big expenditures for medications.

> We know that diarrhoea is less now. The number of rehydration cases is down, and each diarrhoea lasts a shorter period.

> In following their advice, we have changed our hygiene and diet. Now we know these things. Those who follow the advice change; those who do not want to follow them, they don't change.

> We think that women have received advice, and this advice helps them improve our children's health. Thanks to the weighing of children and the food demonstrations our children are not so sick. They are better nourished and eat well. This advice has helped us improve our health, so that now certain illnesses do not get worse.

Although improvements in behaviour and reductions in mortality were observed in both categories of village, the view of these improvements differed in the two types of villages. In the villages without complementary developmental interventions, the focus group participants frequently noted the difficulties of participating in the health education sessions or in accomplishing the recommended changes, as the following comments of the village health volunteers illustrate:

> Without a deep well in the village, women must leave to search for water instead of participating in an educational activity. Also, illiteracy is a brake on their participation, because many women prefer to take care of their own work rather than participate in meetings.

The focus groups highlighted the importance of the village well on women's participation in health promotion activities. In the villages without a well, this is what they said:

> Our principal problem is lack of water. We are tired from going to fetch water. Sometimes we can't even find water. And even for washing it is difficult to find water.

In the villages with a village-dug well, men said the following:

> The well has saved women hours of walking and waiting. During the dry season our wives sometimes spent the entire day getting water. Now they can get it here. And so they have time to go to the education sessions.

Vegetable gardening and soil conservation practices also were noted for their effect on health:

> The gardening has helped us improve the health of our family. Part of the production we use to fortify sauces, and the rest is sold. Then we have money to purchase medicines when we need them.

> There has been a change in everyone's behaviour. Now our eyes are opened. People are more involved in village activities. Thanks to the advice on anti-erosive embankments, there has even been an increase in agricultural production.

Literacy training, including for women, also was seen to be essential to the acceptance of new behaviour. According to the village health committee in one of the villages which did not have a literacy program:

> Training given to the village health volunteers is good, because village health agents alone can't take care of all the health problems in the village. But for the village health volunteers to function well, they need to be literate and to have regular refresher courses.

Table 3 also shows the effect of the programs promoting prenatal care, anti-tetanus vaccination, and improved diet for pregnant women. At the start of the program, 65 per cent of the women knew that women need three or more prenatal consultations, and 42 per cent knew that the first consultation should occur in the first trimester. However, only 28 per cent had any prenatal consultations for their last pregnancy, and only 12 per cent of the women had two or more prenatal consultations. Both the knowledge and the actual visits increased significantly during the project period. At the end of the project, the majority of women surveyed (88%) knew that three or more consultations were needed, and 82 per cent knew that the first consultation should occur in the first trimester. For their last pregnancy, 94 per cent reported having made at least one prenatal consultation, and 68 per cent reported making two or more visits for their last pregnancy. At the end of the project 98 per cent of the eligible women had received two or more anti-tetanus vaccinations. Thanks to the information on the benefits of birth spacing from the village health motivators, at the end of the project 83 per cent of the mothers with a child under two wished to delay their next birth, and of these 48 per cent reported using modern contraceptive methods for this purpose.

Again, the health committees were knowledgeable about these changes:

> The village health motivator helps us a lot in following our children. Thanks to her, we know about all pregnant women in the village. They accept taking chloroquine during their pregnancy (to avoid serious malarial episodes) and they take the iron recommended.

> We have learned how to follow pregnancies, and the changes are due to the discussions. The training is good, because women now understand more, and it's due to the meetings.

> The village midwife now is trained on the factors making for a risky pregnancy. We know when the woman must be evacuated.

District health officers corroborated the increase in referrals for care and delivery since the project commenced.

Women appreciate the information they have received about birth spacing. Among the project benefits articulated by the women were:

> There are the benefits of birth spacing, which are numerous. Such as rest for women, better growth of children, and better for the first child to stay healthy.

> Since the discussions we have learned. Now we space our births.

Summary of the focus-group commentaries

These comments highlight the different processes of acceptance of health messages and behaviour in the two program contexts. In the villages with only health program activities, the villagers wanted to make changes, but they clearly were less able to do so, and they failed to achieve the same kinds of mortality reduction that were obtained in the other villages. Women found it very difficult to find time to attend health education sessions or to carry out some of the simple recommendations. In contrast, in the villages with complementary programs facilitating the accomplishment of basic needs, women had time to go to the educational sessions and learn how to better feed and care for themselves and their children. In addition, some of the developmental interventions positively expanded the resources available for maintaining health: clean water, small amounts of cash to buy food or medicine, vitamin-rich foods to supplement the diet. In this way, the developmental activities were critical facilitators for the adoption of health practices.

The comments clearly reflect the synergism between the health and developmental activities. More importantly, they reflect the villagers' understanding of this synergism and their commitment to continue to promote it.

What we have learned

The program in Burkina Faso demonstrates the efficacy of village-based child survival programs. With fairly limited resources applied over a very short period of time, mothers throughout the project area demonstrated their ability to learn essential child-survival concepts and to apply them in their daily lives. As women and men observed in the focus groups, after learning the new skills, mothers felt competent to handle what were previously serious diarrhoeal incidents. They were glad to learn of steps they could take to protect their children's health, to improve their diet, to avoid malaria, and so on. And they found that they could actually accomplish these steps. Finally, they could see and appreciate the effect these behavioural changes had on their children's survival.

Equally importantly, the program shows the very important multiplier or facilitation effect of complementary non-health interventions. Developmental interventions significantly increase the effect of health interventions, mainly by giving the village women more time and resources to allocate to improving their children's health. In the villages where the health education sessions were not complemented by a variety of activities enabling the villagers to better meet their basic needs, they were less able to attend to the health education messages received. Pressures of time and inadequate financial or food resources limited what these villagers could do for their children and for their own health. They fully understood the dilemma they faced and were eager to undertake well digging and other activities that would enhance their ability to make desired nutritional, behavioural, and health care changes.

This project illustrates the significance of time as a major constraint on behavioural change. Both men and women feel constrained by their heavy work responsibilities. When it comes to a choice between fetching water and listening to the village health motivator, they must choose water. The weaker health outcomes in the villages without complementary developmental activities show that these repeated choices do inhibit major reductions in child mortality. If planners of health programs want to increase their effectiveness, they should carefully plan their activities to minimize the amount of extra and ‘prime’ time demanded for participation in the activity.

Within the health intervention itself, it is important to consider the timing of activities from the villager point of view. Whenever possible, health education sessions or demonstrations should be scheduled off the ‘prime’ working time of the morning and early evening when women are preoccupied with household chores. Complementarities within the program should be fostered whenever possible, as in the Burkina program where the baby weighing became the occasion for food preparation demonstrations. Co-ordination also should be sought among the various providers of health services. In the Sapone district program, for example, immunization coverage increased less than expected because the program could not accurately inform villagers of forthcoming visits by the mobile immunization team and they were unable to co-ordinate these with other events for which the villagers would be gathered anyway.

Consideration also should be given to ways to help men and women restructure their obligations so that more time can be freed to attend sessions and develop new health promotion skills. In the villages with complementary well digging and gardening activities, the activities effectively shifted more work and responsibility to men. The men dug the wells, which in turn enabled their wives to attend health education sessions. Similarly, the men assisted in construction of the vegetable gardens and anti-erosion dikes, which relieved the women's work burden, which normally includes vegetable and peanut cultivation. With these gardens, the women were more certain of producing vegetables, making their time investments more efficient.

To be cost-effective, health programs need to work closely with those promoting economic and infrastructure development, so that the investments in health are not wasted. In an arid area like Burkina Faso, well digging was a high-priority complementary activity for freeing time. The villagers also craved literacy programs, as with these they felt they could better retain the educational messages of the village health motivators. But whatever the essential resource, it is important for the health programs to co-operate with those undertaking developmental interventions so that the basic needs are met and resources are made available for effective participation in the health program.

At a minimum, planners of health programs need to consider the complementary inputs that families require in order to adopt recommended changes. Our experience in Burkina Faso suggests that there is ample desire to improve health. The limits come from the situation that does not easily generate necessary resources. In addition to time, important ingredients for health promotion might include a stable, year-round water supply, expanded availability of vitamin-rich foods, lamps for conducting evening educational sessions, and literacy training for women and men, so they can write down and retain health education messages. Health program staff should co-operate with others so these things can be developed along with the health activities.

It may be that the utility of the developmental interventions goes far beyond their outcomes on time and financial resources. They also may be useful as educational tools. Each program requires the villagers to learn and apply new facts and skills. They have the opportunity to experience the efficacy of applying new ideas or approaches to solve their problems, reinforcing the already strong desire to learn. This experience is likely to be transferred to health interventions through greater receptivity to the interventions and understanding that application of the recommended changes will prove beneficial.

To achieve the maximum from a health intervention, it is important to stimulate and respond to the very positive attitudes towards health improvement, as was found in Burkina Faso. The health program activities did this with the participatory and empowering approach used. The health activities were introduced as steps that villagers could take to help their children to better lives. Fellow-villagers, with the full support of the village health committee, introduced each step; this made each element seem manageable, and hence more likely to be adopted. Further, the villagers put pressure on each other to adopt these activities. The village health volunteers worked hard to encourage women to attend health education sessions and to help them remember what to do.

Another element in the success of the Burkina program was the fact that villagers were accountable for their actions. Deaths, births, and other vital events were monitored regularly, and villagers gathered at least once a year to discuss their progress in achieving mortality reductions and other health improvements. This made improvements self-reinforcing, an achievement they could mutually applaud. In the villages without complementary developmental interventions, they were hungry for more improvements. In the villages where they had undertaken both health and developmental activities, they had much to applaud each year.

References

Barr, D.A. and M.G. Field. 1996. The current state of health care in the former Soviet Union: implications for health care policy and reform. *Journal of the American Public Health Association* 86,3:307-312.

Basu, A.M. and Kaushik Basu. 1991. Women's economic role and child survival: the case of India. *Health Transition Review* 1,1:83-103.

Caldwell, J.C. 1979. Education as a factor in mortality decline: an examination of Nigerian data. *Population Studies* 33,3:395-413.

Caldwell, J.C. 1986. Routes to low mortality in poor countries. *Population and Development Review* 12,2:171-220.

Caldwell, J.C. 1994. How is greater maternal education translated into lower child mortality? *Health Transition Review* 4,2:224-229.

Ewbank, D.C. and S.H. Preston. 1990. Personal health behaviour and the decline in infant and child mortality: the United States 1900-1930. Pp. 116-149 in *What We Know about Health Transition: The Cultural, Social, and Behavioural Determinants of Health*, ed. J.C. Caldwell et al. Canberra: Australian National University.

Jain, Anrudh. 1994. Maternal education and childcare. *Health Transition Review* 4,2:199-206.

LeVine, R.A., E. Dexter, P. Velasco, S. LeVine, A.R. Joshi, K.W. Stuebing, and F.M. Tapia-Uribe. Maternal literacy and health care in three countries: a preliminary report. *Health Transition Review* 4,2:186-191.

Lindenbaum, S. 1990. Maternal education and child care processes in Bangladesh: the health and hygiene of the middle classes. Pp. 425-440 in *What We Know about Health Transition: The*

Cultural, Social, and Behavioural Determinants of Health, ed. J.C. Caldwell et al. Canberra: Australian National University.

Niraula, B.B. 1994. Use of health services in Hill villages of Central Nepal. *Health Transition Review* 4,2: 151-166.

Omorodion, F.I. 1993. The socio-cultural context of health behaviour among Esan communities, Edo State, Nigeria. *Health Transition Review* 3,2:125-136.

Pebley, A.R. and S. Amin. 1991. The impact of a public health intervention on sex differentials in childhood mortality in rural Punjab, India. *Health Transition Review* 1,2:143-170.

Book reviews: Health Transition Review 7, 1997, 109-112

Book reviews

Level 4 Virus Hunters of the CDC. By Joseph B. McCormick and Susan Fisher-Hoch with Leslie Alan Horvitz. Rydalmere: Hodder and Stoughton. 1996. 381pp. Paperback.

This is the real-life story of two epidemiologists who have worked at the forefront of virus investigation in the last thirty years. The book is biographical in a professional sense, but avoids the usual personal detail generally acceptable in a biography.

The book can be divided into two separate sections, with McCormick claiming the lion's share of storytelling. Both epidemiologists tell their stories in the first person, often giving their own personal perspective to the same story. This gives a strong sense of repetition throughout the book, but at the same time exemplifies the subjectivity of disease reporting and investigation.

Both McCormick and Fisher-Hoch started their professional medical lives later than usual. McCormick had worked in Africa as a science teacher for the Methodist Church, and seeing the effects of viral disease in rural areas, decided to study medicine. He trained in the United States at Duke University. Fisher-Hoch began her medical career by fighting the system to gain a place as a mature-age student at the Royal Free Hospital, London.

The doggedness displayed by both authors at the start of their medical careers foreshadows their approach to epidemiology and explains some of their impressive results.

In each case, conventional medicine was not particularly attractive, and was quickly rejected in favour of Public Health Medicine. McCormick joined the CDC in Atlanta in the early 1970s, and was immediately enrolled in the Epidemic Intelligence Service course. This began a career of pursuing outbreaks of Ebola, Lassa fever, Congo Hemorrhagic fever and AIDS viruses in Zaire, Sudan and Pakistan.

McCormick's writing is intense and direct, with a frank account of both successes and failures. The close calls encountered by fieldworkers, including the authors, makes the story even more interesting.

The tale of the British nurse who was evacuated to Great Britain from Sierra Leone is significant. The overreaction of authorities, apparently deliberate delays in responses, and reluctance to accept a case of Lassa fever demonstrate the fear and misinformation even so-called experts demonstrate.

McCormick and Fisher-Hoch tell of surgeons, doctors and nurses infected with Lassa, and with the difficulties encountered in trying to educate staff on the principles of infection control. The authors note that in most cases, poorly-educated doctors are trying to cope in badly equipped hospitals and clinics, and having to re-use equipment such as syringes and needles many times. The medical workers under such conditions often become the agents for the spread of disease rather than its cure.

The ever-present role of viruses and their ability to infect humans and animals opportunistically is the strong point of the story. It is very clear that viruses are given more chances to spread and infect communities that are poor, uneducated and lacking in basic resources. The authors make it evident that overpopulation, poverty and the uncontrolled growth of large cities must be considered as vital links in the chain of disease. Their stories demonstrate that it is vital for epidemiologists to consider social issues together with medical ones to attempt to control infectious disease.

While this book is not intended as a thorough account of viruses and virus investigation, it does give a frank and interesting account of fieldwork in developing countries. It describes the motivation, patience, persistence, creativity and imagination required of a field epidemiologist in trying to cope with poor facilities, cultural and language barriers, and corrupt governments. The authors paint a vibrant, colourful picture of their work, and transmit their enthusiasm and commitment to disease investigation.

The personal and professional relationships between researchers and epidemiologists are glossed over, but much is communicated between the lines, about the politics of Public Health research.

Robin Davies
National Centre for Epidemiology and Population Health
Australian National University

Medical Anthropology in Ecological Perspective. Third Edition. Ann McElroy and Patricia K. Townsend. Boulder: Westview Press. 1996. xxiv+434pp. Paperback. US$27.95.

Medical anthropology elucidates the perception and achievement of health by the world's peoples. It does other things as well but in the area of health, the linkage of interests with medical ecologists is quite direct and McElroy and Townsend have now produced a third edition of *Medical Anthropology in Ecological Perspective,* their presentation of the cultural ecology of health for medical ecologists and people with similar interests.

Reworked and updated, it retains the emphasis on basic social, cultural and behavioural determinants of health and includes some of the classic discoveries, such as Glasse and Lindenbaum's work on kuru, often in the context of 'profiles' exemplifying chapter topics. The book presents cultural aspects of health as seen from an anthropological perspective, moving first from the environment and genetics to the cultural ecology of fertility, mortality, nutrition, illness and healing, and contemporary cultural issues in world health and world health services systems, including attitudes towards health services systems in developed countries. The impact of AIDS is considered from the perspectives of its social epidemiology and its stress on health care systems in traditional economies. The book ends with a review of needs in poorer countries with respect to health education and health care workers and emphasizes the effectiveness of traditional birth attendants in promoting general health. The list of references is extensive and runs to 40 pages.

Although the necessity of understanding cultural perceptions and practices is espoused by medicine in general and medical ecology in particular, there sometimes seems the hope that such things will not matter or that transferral of a successful intervention from one traditional society to another will be unproblematic. An occasional theme of McElroy and Townsend is a health intervention's recovery from a false start once confounding socio-cultural factors were sorted out. But the book does not harp on such stories. Rather it presents much useful material about the range of cultural issues that emerge when various aspects of health amongst traditional, minority and even wealthy peoples are engaged. We cannot all read mountains of anthropological literature or even all that pertains to the groups with which we work. But most of us have time to read a general text on medical anthropology and learn something about what commonly confronts us when dealing with the health of other cultures or socio-economic groups, and something about how to develop appropriate cultural information in the course of our own projects. McElroy and Townsend remain a solid point of departure for doing so from the perspectives of cultural and medical ecology.

Jeff Marck
Health Transition Centre
National Centre for Epidemiology and Population Health
Australian National University

Evaluating Health Promotion: A Health Worker's Guide. By Penelope Hawe, Deirdre Degeling and Jane Hall. Sydney: Maclennan and Petty. 1995. Paperback. xii+254pp.

Evaluating Health Promotion is one of those instructional tomes that manages to deliver an intelligent synthesis of the authors' practical experience in such simple and precise language that the reader is left with a genuine understanding of the 'hows' and, more importantly, 'whys' of program evaluation.

It not only deals with such issues as 'how' and 'when' to evaluate, but also takes the reader step-by-step though the complex processes of good program design, ensuring an appreciation of the stages of planning and implementation which must be achieved to optimize program function before evaluation should be considered. In defining the process of program design it reveals the intricacies of effective evaluation without jargonistic tendencies.

Highlighting the practicalities of program design and evaluation is one of this book's strongest features. It clearly defines the differences between such fundamental concepts as goals and objectives, when qualitative methods or quantitative methods are more appropriate, what is meant by the various concepts of 'need' , how to identify the core health problems of a population and then the more practical aspects of program planning and evaluation such as measuring 'impact' and 'outcomes', questionnaire design, and a complete guide, down to the 'biscuits and tea', to running a focus group.

True to content, each chapter begins with a clearly defined list of educational objectives for the reader and ends with a summary of the salient points from each, followed by a brief guide to further reading in the area of interest. Each chapter contains just the right amount of practical 'Activities' which are usually straight from the experience of the authors. These are followed by sensible 'Feedback' on how best to deal with the issues raised in the 'Activities', a list of the possible problems which may arise and the most commonly made mistakes for each example. The chapters are presented in logical order and all in the same simple terms and with the same ease of delivery.

The body of the text is ended with an up-to-date 'where to look for help if you need it' guide and an annotated bibliography of books and journal articles which are relevant to the area. There is an excellent glossary of terms used throughout the text or commonly used in the field. It is written from within the Australian experience and contains many example of well-known Australian studies, but would be equally useful outside Australia because of its universal themes.

Called by the authors 'A Health Worker's Guide', this book would be perfect for a range of people: absolute beginners, health care workers involved in capacity building, and people with experience but little formal training in health promotion planning or evaluation. It may also be a good refresher course and reference book for people already working in the industry who may need a little help in regaining their focus on the important issues. I would thoroughly recommend this generous and intelligent book to anybody with an interest in program planning and evaluation or just in good instructional writing.

Ann-Maree Nobelius
Health Transition Centre
National Centre for Epidemiology and Population Health
Australian National University

Predicting Health Behaviour. Mark Conner and Paul Norman (editors). Open University Press. 1996. 230pp. Paperback.

Practitioners involved in health promotion or with an interest in the study of health behaviour will find this guide beneficial. Health behaviour study is based upon the assumption that much disease in industrialized nations is due to modifiable behaviour patterns. The social cognition model recognizes the behaviour of individuals in the context of their perception of their social environment. Identification of these behaviour patterns enables the introduction of suitable interventions and provides increased understanding of the behaviour of individuals. This book provides detail on the application of five commonly used social cognition models used in the prediction of health behaviours.

The five models, presented as five chapters are the health belief model, health locus of control, the protection motivation theory, the theory of planned behaviour and self efficacy models. As the authors point out, this is not new information but a convenient presentation of five social cognition models. The juxtaposition of these models enables a critical evaluation of the strengths and weaknesses of each social cognition model.

Clear use of diagrams and flow charts facilitates the easy understanding of each model. A comprehensive description of each model is presented with good examples of applications of each and a frank account of the strengths and weaknesses of each model. The authors concentrate on more common interventions including changes to sexual behaviour, dietary and cigarette smoking habits.

Whilst these models explain only a small portion of our understanding of health behaviour, the reader develops a clear understanding of the possible applications for each model and the development of adequate measures utilizing each model. Future directions for the development and application of each model is provided in the summary of each chapter.

This book is a valuable resource for those interested in health promotion as a focus on ways to change health behaviour. It is presented in a manner which is accessible to those without a background in health behaviour and it provides an excellent introduction to the areas of social cognition models and their applications.

Susan Nancarrow
National Centre for Epidemiology and Population Health
Australian National University