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The Trends in Neonatal, Infant and Child Mortality in Matlab Project Period

Introduction

THE question of whether child health is significantly improved by maternal and child health (MCH) and family planning (FP) programmes in rural third world settings has been the subject of considerable discussion and debate. Health interventions such as vaccines and other preventive measures have been developed, field tested and researched in numerous studies but the question of how a package of services can best be delivered to rural impoverished populations and how much mortality impact will accrue from such a programme continues to be an issue in the literature, principally because of measurement problems (Gwatkin *et al.*, 1980). The paucity of research on MCH impact has led some observers to conclude that there is conclusive evidence that certain technologies can work, but it is unknown as to how much impact can be expected in large scale public sector health interventions for the poorest of lesser developed countries (Dekadt & Segall, 1981). The Matlab experiment is instructive because if the package of MCH services is potentially replicable and longitudinal data permit assessment of MCH service effects (Chen *et al.*, 1983).

To address this question of the impact of MCH-FP the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) launched a study in 1977 known as the Family Planning Health Services Project with the aim of reducing fertility and mortality (Gwatkin *et al.*, 1980). The present paper represents an initial analysis of trends in infant and child mortality in Matlab with the aim of clarifying past trends and future research implications. We begin by

briefly describing the service interventions in Matlab and the existing research on the impact of those services. Next we discuss trends in neonatal, infant, and child mortality rates over the project period. Finally, we briefly discuss the implications of the observed trends and previously published findings for future research.

The Matlab Family Planning Health Services Project

The Matlab Family Planning Health Services Project (FPHSP) was initiated in October 1977 in half of the field surveillance area in Matlab thana of Chandpur district. The service area presently covers 70 villages with a population of approximately 90,000. A comparison area comprised 79 villages is served exclusively by the government health and family planning programme (Bhatia *et al.*, 1980; Phillips *et al.*, 1984*a*). Services in Matlab were developed gradually with initial emphasis on family planning and subsequently with a phase by phase introduction of MCH. In the initial phase, MCH was limited to maternal and child care at Family Welfare Centres and simple health education (Phillips *et al*, 1984*b*). In mid 1978 a tetanus vaccination programme was introduced which was restricted to pregnant women. Results showed that acceptance rates were low and that initial mortality impact was minimal (Rahman *et al.*, 1982*a* & *b*). In January 1979 an oral rehydration programme was introduced, but its impact on mortality differentials remains uncertain: areal impact of the Matlab treatment centre and the special speedboat ambulance system has been widespread. Low diarrhoeal disease mortality throughout Matlab has thus complicated mortality impact assessment (Zimicki *et al.*, 1984).

Method and Procedures

Neonatal, infant and child mortality rates were obtained by compiling routinely collected vital data from the ICDDR, B vital registration system covering the FPHSP treatment and comparison areas. We have processed vital data for the present analysis from Matlab death and birth records for the January, 1974 to December, 1982 period. In this analysis 4256 neonatal and 3185 post neonatal deaths were recorded among the 62211 live births registered over the 1974-1982 period. The neonatal deaths were considered from 0 to 28 days. For child mortality, the aggregate number of children aged over 365 days but less than 60 months is the denominator and deaths in the corresponding age range form the numerator. No attempt has been made to link individual events, but rates were readily tabulated for area over time. Thus the present paper is an analysis of aggregate time series data from treatment and comparison areas of the FPHSP. In all there are nine years of data available for that 149 villages of the FPHSP treatment and comparison areas.

Results

Table 1 presents the neonatal, post-neonatal and infant mortality rates in the FPHSP treatment and comparison areas for the 1974 to 1982 period. In this

TABLE 1—DISTRIBUTION OF NEONATAL, POST-NEONATAL AND INFANT MORTALITY RATES IN TREATMENT AND COMPARISON AREAS OF FAMILY PLANNING HEALTH SERVICES PROJECT, MATLAB (1974-1982)

Year	*Neonatal*		*Percent*	*Post-neonatal*		*Percent*	*Infant*		*Percent*
	Treat	*Comp*	*Difference*	*Treat*	*Comp*	*Difference*	*Treat*	*Comp*	*Difference*
1974	68.8	77.0	—10.6	54.6	69.5	—21.4**	123.4	146.5	—15.8**
1975	65.2	83.3	—21.7**	115.6	114.7	+ 0.8	180.8	198.0	—8.7
1976	54.1	65.4	—17.3*	42.6	33.9	+25.9*	96.8	99.3	—2.5
1977	74.3	63.7	+16.6*	41.9	48.1	—12.9	116.2	111.8	+3.9
1978	68.5	77.7	—11.8	45.5	46.9	—3.0	114.0	124.6	—8.5
1979	71.0	74.0	—4.1	43.7	44.1	—0.9	114.7	118.1	—2.9
1980	59.0	71.9	—17.9*	34.1	43.9	—22.3*	93.1	115.8	—19.6**
1981	65.0	68.7	—5.4	36.9	45.8	—19.4*	101.9	114.5	—11.1*
1982	58.2	67.0	—12.7	47.7	51.1	—6.6	106.2	118.1	—10.1

*$P < .05$
**$P < .01$
***$P < .005$

period the neonatal mortality rates were higher in comparsion areas than in treatment areas except in 1977. This areal differential is further illustrated by the quarterly distribution of neonatal mortality presented in Figure 1. As the Figure shows during the 1975 and 1976 period mortality rates of neonatal deaths were higher in comparison areas than in FPHSP treatment areas. A plausible hypotheses for explaining the observed differences in 1974 concerns a mass immunization programme in which tetanus represents the placebo in a double blind trial of the cholera vaccine. In this study more of the population

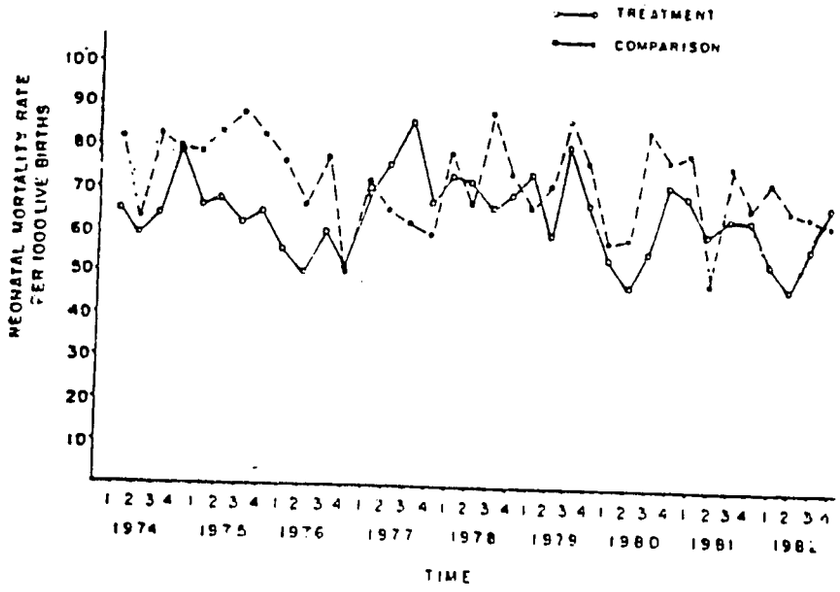

Fig. 1. Neonatal Mortality Rate in Treatment and Comparison Areas of Family Planning and Health Services Project Matlab, 1974-1982.

in treatment area was covered than in comparison areas. Thus the pre programme decline in neonatal mortality rates may be attributable to confounding effects of the 1974 vaccine trial which reduced neonatal mortality rates in the FPHSP treatment area relative to comparison areas. The neonatal mortality rates were thus statistically significantly lower in treatment areas in 1975, 1976, and 1980, but higher in 1977 despite the fact that systematic intervention from the FPHSP did not begin until 1978. Because the cholera test vaccine and thus the placebo was given to more women in FPHSP treatment than to comparison areas, more of the treatment area mothers' live birth in 1975 and 1976 were protected against tetanus; 57.4 percent in treatment area and 42.6 percent in comparison area received tetanus vaccination. Moreover 80 percent of the villagers in treatment areas were given vaccination compared to 60 percent villagers in comparison area. Thus, campaign coverage was more complete in treatment areas.

Figure 1 presents the neonatal mortality rates for treatment and comparison areas among the infants 0-28 days over 1974-1982 period and suggested that there may have been a slight maternal child health and family planning impact of the program late in 1978. The neonatal mortality rates are slightly lower in FPHSP treatment than in comparison areas.

Figure 2 presents the post neonatal mortality rates among infants in treatment and comparison areas for the 1974-82 period. It reveals that there was slight decline of post-neonatal mortality rates after initiation of FPHSP pro-

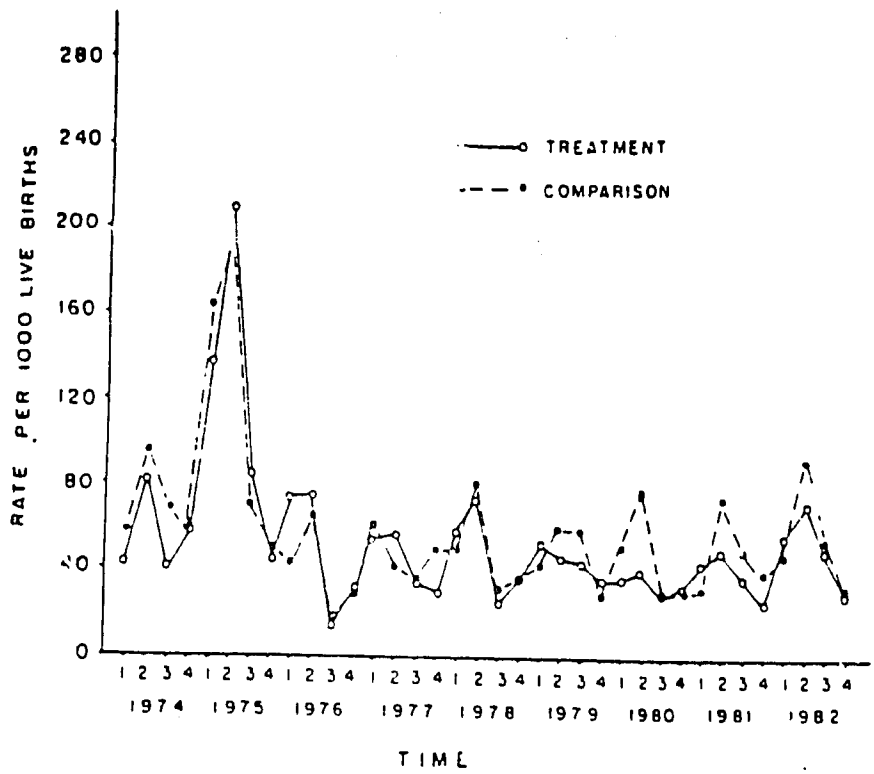

Fig. 2. Post Neonatal Mortality Rates in Treatment and Comparison Areas of Family Planning and Health Services Project, Matlab, 1974-1982.

gramme in 1977. The trend in the difference achieved prominence in 1980 and the succeeding period owing to the dampening of the seasonality of rates (Rahman *et al.*, 1982 and Beckar, 1981).

Figure 3 depicts the overall infant mortality rates in treatment and comparison areas over the 1974-82 period. The figure shows that after one year of the initiation of the FPHSP programme the infant mortality rates declined, most prominently in 1980, 1981 and 1982.

Figure 4 presents the mortality rates for treatment and comparison areas among the children over 365 days but less than sixty months over the 1974-1982 period. The figure shows that mortality rates diverge steadily subsequent to the 1977 intervention. This divergence in rates cannot be attributed to specific interventions but suggests, nevertheless, that the package of FPHSP interventions may have had an impact on childhood mortality.

Conclusion

The findings presented here are consistent with the view that the FPHSP has

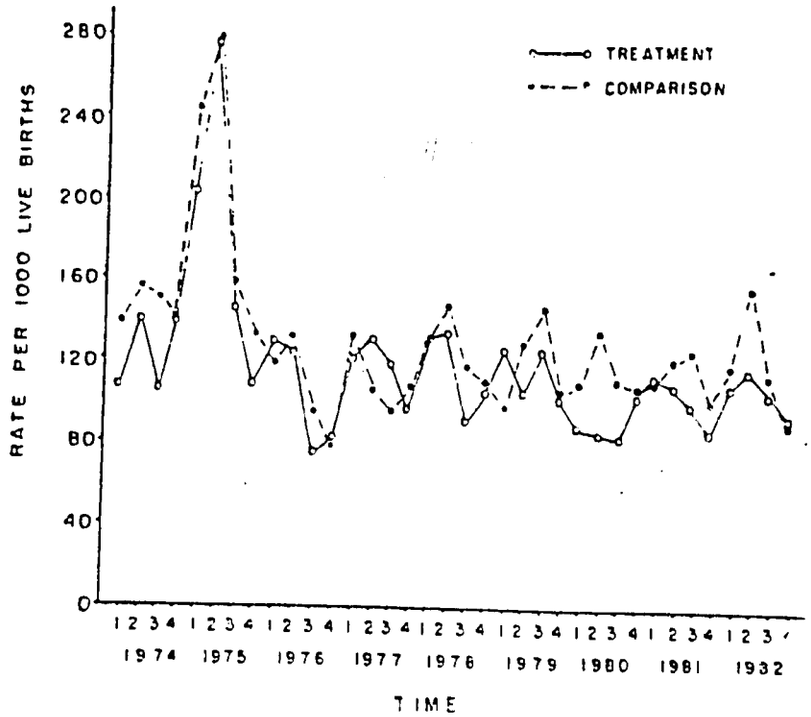

Fig. 3. Infant Mortality Rates in Treatment and Comparison Areas of Family Planning and Health Services Project, Matlab, 1974-1982.

had a mortality impact. Since trends began prior to the major mortality interventions, findings suggest that the observed trends may be associated with the pronounced fertility decline that began in Matlab immediately prior to the mortality decline. This tentative conclusion bears further investigation, however, as it is appropriate to model areal specific mortality time series as a function of interventions in place. Moreover, since trends consistent with the hypothesis of a mortality impact from fertility decline are demonstrated in this analysis, there is a need for further work on the covariates of the observed mortality decline using individual level event history data from Matlab on contraceptive use, fertility change and mortality impact. Finally, to fully understand mortality trends requires data on proximate determinants of mortality and improved system for recording causes of deaths.

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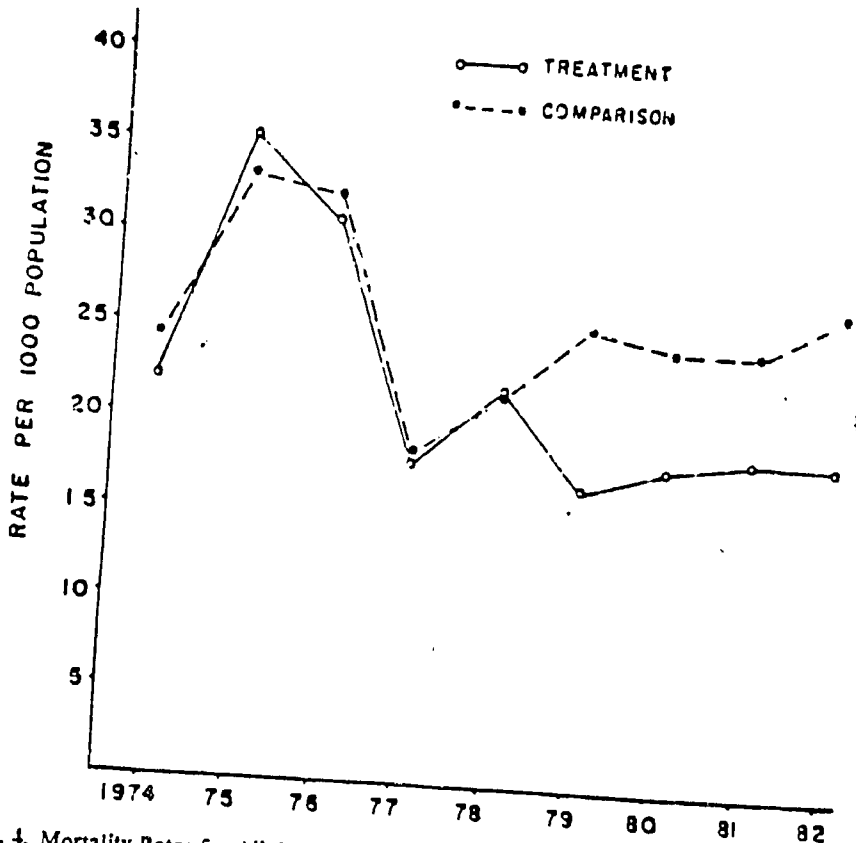

Fig. 4. Mortality Rates for All Causes Among Children 1-4 Years in Treatment and Comparison Areas of Family Planning and Health Service Project, Matlab, 1974-1982.

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