

Improving Infant Nutrition, Health, and Survival

Policy and Program Implications from the Malaysian Family Life Survey

William P. Butz,
Jean-Pierre Habicht,
Julie DaVanzo

Rand

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Prepared for the
Agency for International Development





PREFACE

This report is the edited transcript of a briefing given to staff of the Agency for International Development in June 1981 in Washington, D.C. It is a companion report to *Birthspacing, Fertility, and Family Planning: Policy and Program Implications from the Malaysian Family Life Survey*, R-2925-AID, November 1981, by Julie DaVanzo and William P. Butz. These two reports present selected results from a series of projects funded by the Agency for International Development between 1973 and the present. The goal of these projects is to identify family, community, and program influences on contraceptive use, breastfeeding, birthspacing, fertility, and infant mortality in Peninsular Malaysia.

This report concerns influences on the nutrition, health, and mortality of infants. Its purpose is to summarize those of our research findings that are likely to be most directly useful to policymakers and program managers. This has meant neglecting a great deal in order to deal usefully with the major points. It has also meant glossing over details that are necessary for evaluating the quality of our data and analysis. For these, we refer the reader to our more technical Rand publications:

- (1) William P. Butz and Julie DaVanzo, *The Malaysian Family Life Survey: Summary Report*, R-2351-AID, 1978.
- (2) John Haaga, *The Quality of Retrospective Data from the Malaysian Family Life Survey*, N-1823-AID, 1982.
- (3) Julie DaVanzo and John Haaga, *Anatomy of a Fertility Decline: Ethnic Differences in the Experience of Malaysian Women, 1950-1976*, N-1639-AID, 1981.
- (4) William P. Butz, Julie DaVanzo, and Jean-Pierre Habicht, *Biological and Behavioral Influences on the Mortality of Malaysian Infants*, N-1638-AID, 1982.
- (5) Julie DaVanzo, Jean-Pierre Habicht, and William P. Butz, *Assessing Socioeconomic Correlates of Birthweight in Peninsular Malaysia: Ethnic Differences and Changes Over Time*, N-1637-AID, 1981.
- (6) William P. Butz and Julie DaVanzo, *Determinants of Breastfeeding and Weaning Patterns in Malaysia*, forthcoming.
- (7) Jean-Pierre Habicht, William P. Butz, Linda Meyers, and Julie DaVanzo, *The Effect of Breastfeeding on Postpartum*

Amenorrhea: Estimates from a Model Based on the Intermediating Hormone Levels, N-1640-AID, forthcoming.

- (8) William P. Butz and Julie DaVanzo, *Breastfeeding, Contraceptive Use, and Birthspacing*, forthcoming.

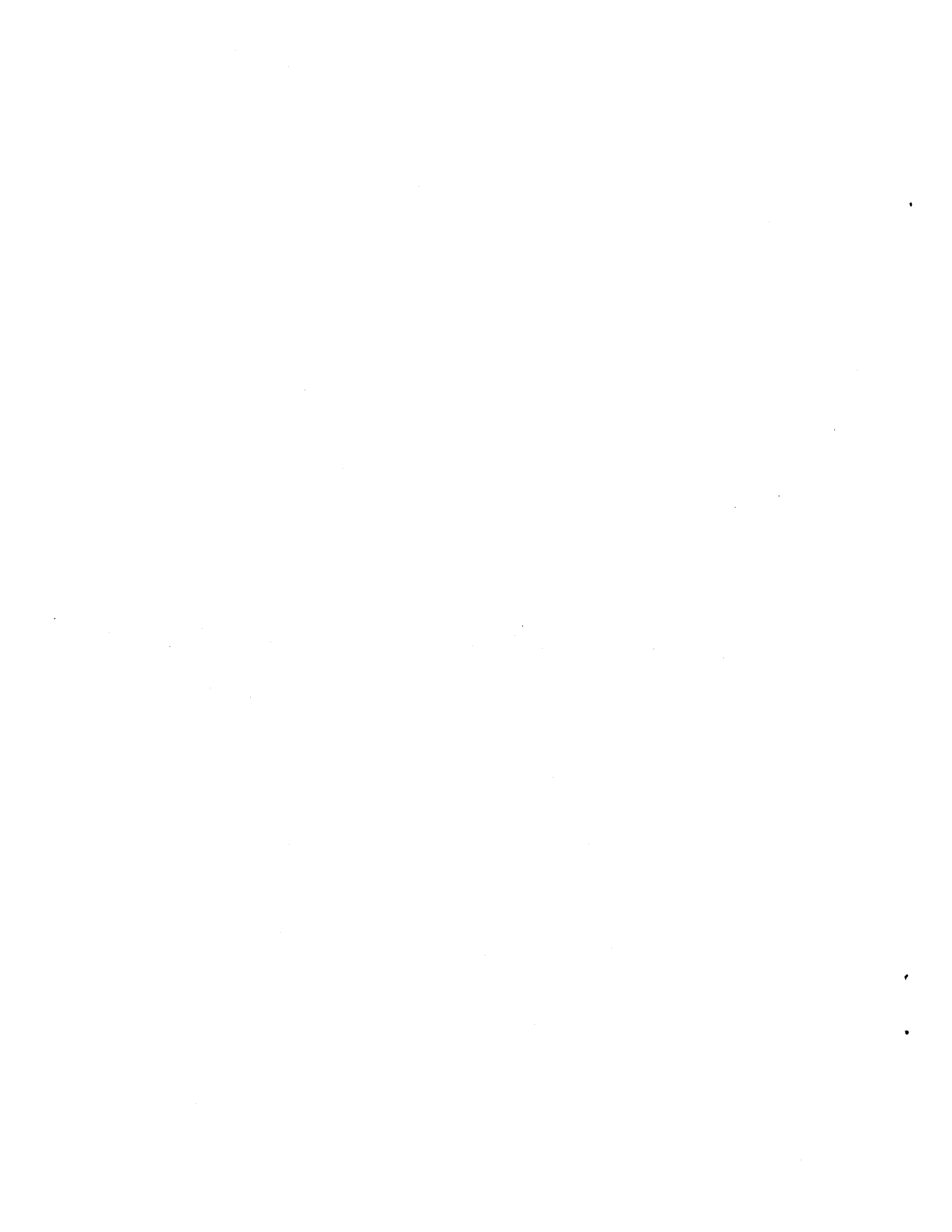
Readers interested in the technical bases for particular findings will find these publications cited by number in the text of this report.

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William P. Butz and Julie DaVanzo are economists at The Rand Corporation. Jean-Pierre Habicht is James Jamison Professor of Nutritional Epidemiology at Cornell University.

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IMPROVING INFANT NUTRITION, HEALTH, AND SURVIVAL: POLICY AND PROGRAM IMPLICATIONS FROM THE MALAYSIAN FAMILY LIFE SURVEY

INTRODUCTION

Infants' nutrition, health, and survival are matters of great concern in developing countries. This report presents the principal program and policy implications from a survey and research project that has investigated these phenomena in Peninsular Malaysia.

We begin by describing the Malaysian setting, particularly post-World War II trends in infant mortality and breastfeeding. These are the two policy targets of central interest. We then describe the data analyzed in this research and briefly indicate their quality. With this background, we proceed to the central topic: our research findings that are relevant for public programs in the areas of health, nutrition, family planning, water, and sanitation, as well as several findings with implications for overall socioeconomic policy. The report ends by emphasizing the most important implications for future research and for current program and policy initiatives.

THE MALAYSIAN SETTING

Malaysia is an interesting setting for research on infant mortality, health, and survival for several reasons. One is that it has been a rapidly developing country. Economic growth and concomitant changes in contraceptive use, breastfeeding, fertility, and mortality have proceeded more rapidly here than in most developing countries. What is learned about Malaysia may therefore be useful in other countries where these changes have been slower in coming.

Malaysia is also an interesting setting because its government is seriously interested in instituting programs to reduce fertility and improve the health, nutrition, and survival prospects of children. Considerable public resources have been devoted to these concerns. Furthermore, ministries and agencies not directly charged with these matters have joined in interministry committees to consider the indirect effects of their programs. Finally, Malaysia contains three ethnic groups that are important elsewhere in Southeast Asia: Malays,

who constitute about half of the population; Chinese, about a third; and Indians, most of the rest. Findings concerning these groups in Malaysia may, to some extent, inform policy in other countries as well.

TRENDS IN INFANT MORTALITY AND BREASTFEEDING

The policy target of principal interest in this report is infant mortality. Figure 1 shows that the Malaysian infant mortality rate (the number of deaths in the first year of life per 1000 live births) has declined from a level around 100 in 1945-1950 to about 30 in 1975. This decline is among the steepest in developing countries. However, it has not been equally shared among various segments of the population, for example, among the three ethnic groups. Important goals of this project have been to identify correlates of this general mortality decline, and factors that can explain the steeper declines in some groups.

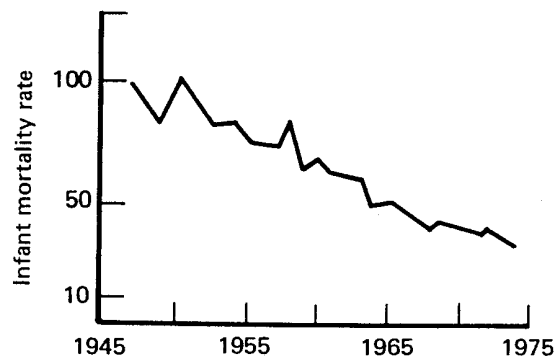


Fig. 1—Trends in infant mortality

One factor that emerges as an important influence on infant mortality, especially under certain environmental conditions, is breastfeeding. Figure 2 shows trends since World War II in the proportion of infants who breastfed in Malaysia. Both initiation of breastfeeding and the duration (not shown) among those who breastfeed have declined in Malaysia in the last 30 years, as they are now declining in

many other developing countries.(3,6) In the 1950s, 90 percent of babies were breastfed, whereas by the 1970s, the proportion had fallen to 75 percent. The decline has been very modest for Malays but quite steep for Chinese. The downward trends among Chinese and Indians are even more dramatic for young women: By the 1970s, less than a third of Chinese women breastfed their first- or second-borns, compared with over 80 percent in the 1950s.(3)

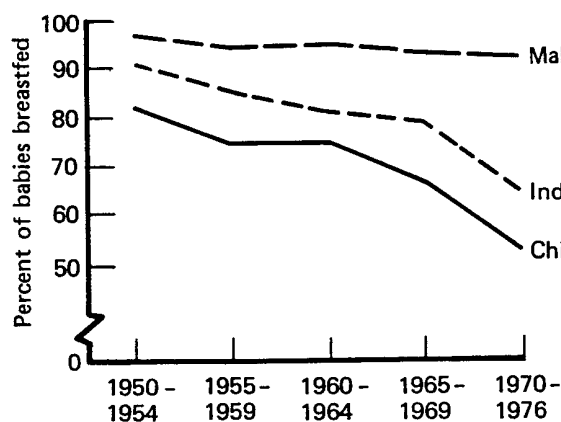


Fig. 2—Trends in breastfeeding

Hence, in spite of significant breastfeeding declines, infant mortality has fallen rapidly in Malaysia. Both trends—in breastfeeding and infant mortality—are now under way in a number of other developing countries. For some groups in Malaysia, however, we will see that the decline in breastfeeding is associated with higher infant mortality.

DATA

The data for our research are from the Malaysian Family Life Survey (MFLS).(1) This survey was designed and fielded by Rand, in collaboration with the Government Department of Statistics in Malaysia and with Survey Research Malaysia, a private survey research firm. The survey contained three rounds, was fielded in 1976-77, and included a sample of 1262 households. The female respondents in these households reported over 5500 live births. These infants are the observations on which the analyses reported here are based.

Much of the information about these infants is from mother-reported retrospective life histories which document biological and behavioral characteristics of infants, mothers, and families, as of the time of each pregnancy outcome. Obviously, the quality of such recall data on breastfeeding, birthweight, fertility, infant mortality, and other such variables is highly suspect. Accordingly, our colleague John Haaga has investigated the reliability and validity of these data using several methods.(2) First, he compared our retrospective data with data collected prospectively at various times in the past. For example, Fig. 3 reproduces from Fig. 1 the trends in infant mortality that emerge from the Malaysian vital registration system. Superimposed are the corresponding trends from the Malaysian Family Life Survey. There is no evidence of decreased reporting of infant mortality in the distant past, as would occur if mothers tended to forget babies who died years ago. The difference between males and females (not shown) corresponds very closely to the difference found in vital statistics data. Likewise, the Chinese-Malay differences are very similar in the two data sources. The Malaysian Family Life Survey, however, shows substantial increases in Indian infant mortality since 1965, whereas the vital statistics data show their mortality to be nearly level. We do not know the reasons for this inconsistency, but the Indians are a relatively small part of our sample and of the Malaysian population as a whole.

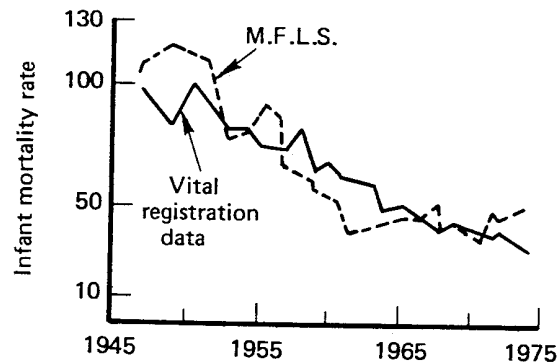


Fig. 3—Validity and reliability of infant mortality data

Haaga also investigated the data's quality by comparing responses to similar questions asked four months apart in the survey and by investigating the internal validity of the data in several ways. For example, the interview-reinterview comparisons of whether each mother's first child breastfed and for how long revealed excellent correspondence. The data on duration of breastfeeding, however, do have one undesirable characteristic: the reported lengths of breastfeeding are highly peaked at 6, 12, 18, and 24 months. This pattern does not reflect peaking in actual breastfeeding lengths. It is instead an artifact of the way women answered our questions, or perhaps of the way we asked.

Finally, in the course of analysis, we have continually compared our findings with results from other studies based on prospective data, frequently clinical data, which should be more reliable. For example, in spite of the peaking in breastfeeding data, the statistical associations between length of breastfeeding and other variables, such as the length of postpartum amenorrhea, are generally quite close to the associations reported from clinical studies.⁽⁷⁾ We conclude that for many purposes, although not for all, the peaking in these data does not seriously affect the inferences to be drawn.

We now turn to the principal findings of our research, some of which we illustrate graphically. These derive from multivariate analyses which control many influences on the phenomena of interest. Some of these findings have potential implications for programs and policies; they are new in these analyses and should therefore be further substantiated before being adopted as the basis for program or policy actions. Other findings are so consistent with biomedical and behavioral theory and with the findings of other studies that, in our opinion, they have immediate utility. After discussing these findings, we conclude with a list of recommended program and policy initiatives.

FINDINGS PERTINENT TO HEALTH, NUTRITION, AND FAMILY PLANNING PROGRAMS

Babies born to very young mothers (less than 19 years old) are much more likely to die in infancy.⁽⁴⁾ This fact is known from other studies. What is new here is the additional finding that this increased mortality is concentrated in the first month of life. Various biomedical factors could lead to this association, but the environmental and behavioral factors that might cause infant deaths to very young mothers would not normally have their effects until later in infancy. Therefore, we infer from this pattern of very early mortality, as well

as from other evidence, that this association between mothers' young age and babies' deaths is due to biological causes, rather than to behavioral ones.

Babies born to mothers older than 40 are also more likely to die.(4) Some die in the neonatal period. Other deaths are concentrated in the second six months of infancy. No known biological mechanism would produce this pattern of late infant mortality, but several behavioral factors associated with older motherhood could cause it.

These two infant mortality patterns imply that family planning programs should focus on very young and much older mothers for reasons of babies' health and survival, apart from the usual reasons of reducing fertility and improving mothers' health and well-being.

Babies born soon after a previous birth tend to have lower birthweight and higher infant mortality, especially in low-income families.(5,4) This association could arise from the fact that premature infants tend both to follow short birth intervals and to have low birthweight. Alternatively, the association could arise from maternal nutritional depletion, which can be caused by short birthspacing and then itself lead to low birthweight. Our analysis suggests that both of these are true, though it is not clear which is more important. To the extent that prematurity leads to short birthspacing and low birthweight, then the appropriate program interventions would be directed at preventing prematurity. If, instead, short birthspacing is the most important cause of low birthweight and of subsequent elevated infant mortality, then interventions should focus on the prevention of short birthspacing.

Inadequate nutrition of teenage girls, reflected in late age of menarche (age of the girl's first menstruation), reduces the birthweights of these girls' babies.(5) This result emerges both in the raw data and when controlling for other influences on birthweight, such as the mother's age and parity, family income, and the child's sex.

This relationship between menarche and birthweight is a new finding. If it is corroborated in other studies, it means that program efforts to improve women's nutrition should be reaching them before menarche. This is at least five to seven years before existing maternal/child-health programs typically find them. By the time these programs currently reach women, low-birthweight babies may be preordained.

The presence of relatives in the household (apart from members of the nuclear family) is associated with a higher tendency to begin breastfeeding.(6) The association is strongest for births since 1970 and is nonexistent for births before 1960. This overall pattern is consistent with the hypothesized importance of a "doula," another woman who gives advice and support concerning breastfeeding. Two decades ago,

when breastfeeding was nearly universal in Malaysia, it is reasonable to assume that the presence of other women who could help was immaterial. More recently, however, with the rise of pressures against breastfeeding and fewer women practicing it, it appears that this factor has become important. Interestingly, women who do begin breastfeeding tend to wean their children earlier when other relatives live in the household. It may be that although these relatives encourage the mother to begin breastfeeding, later on they help to feed the baby, freeing the mother to stop breastfeeding earlier and do other things with her time.

Availability of family planning clinics is associated with the practice of breastfeeding.(6) Women living near family planning clinics on agricultural estates are less likely to breastfeed. This may occur because women treat breastfeeding and other contraceptives as substitute methods of delaying the next birth. Many women do so, according to evidence in our companion report on birthspacing. However, women in our sample who live near family planning clinics that are integrated with maternal/child health-care activities are *more* likely to breastfeed. Hence, there may be something about the operations of these integrated clinics that, despite their offering alternative ways of spacing births, increases mothers' tendency to breastfeed.

Among women who begin breastfeeding, those living near a family planning clinic tend to wean their babies earlier, no matter what type of clinic it is. If women commonly begin using estrogen birth control pills before they stop breastfeeding, their shorter breastfeeding could be due to hormonal interference between the pills and lactation. The shorter breastfeeding might also be in response to advice against breastfeeding while taking the pill. Finally, the shorter breastfeeding could be explained by a substitution of modern contraceptives for breastfeeding.

Thus, although *some* clinics seem to be encouraging women to initiate breastfeeding despite the general tendency of women to treat modern contraceptives as a substitute for breastfeeding, women who live near any type of clinic tend to wean their babies earlier. Despite early weaning, the babies who *began* breastfeeding have received its protection at least during the critical early months. It remains to be seen whether banning estrogen compounds during lactation—the emerging public health practice—will reverse this shortening of breastfeeding.

The place where a woman gives birth is associated with initiation of breastfeeding.(6) Even when many other influences on breastfeeding are controlled, women who give birth in private maternity clinics are significantly less likely to begin breastfeeding than women who give birth at home (Fig. 4). Although place of birth is significantly associated with whether a woman begins to breastfeed, once she begins

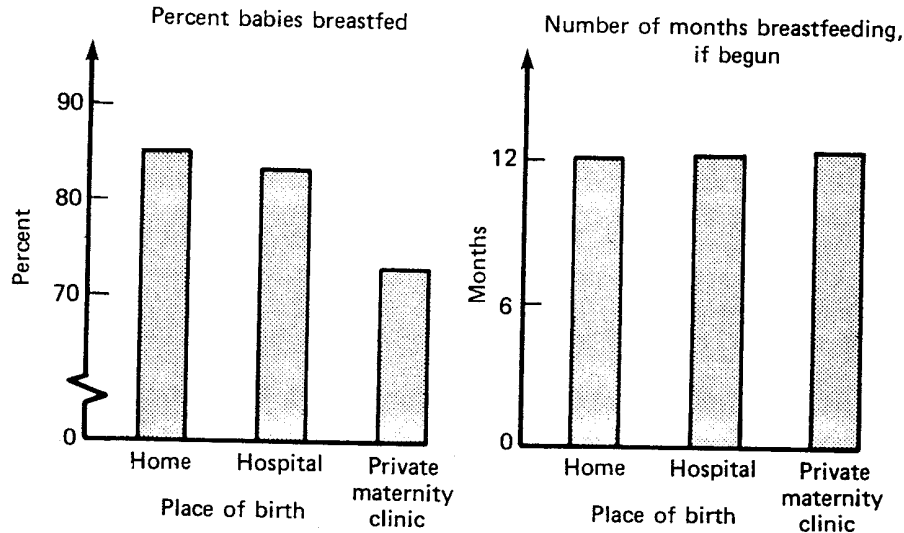


Fig. 4—Association between baby's place of birth and breastfeeding

there is no association with how long she continues. This suggests that the influence of birthplace is not due to attitudinal factors associated with choice of birthplace, but with actual differences among birthplaces in perinatal and nursery practices. It may be that these clinics use heavier anaesthesia at birth, that they separate the baby and mother for a longer time, or that they distribute free bottles and infant formula. These possible reasons merit investigation with data that are more focused on this question.

FINDINGS PERTINENT TO WATER AND SANITATION PROGRAMS

Babies in households with piped water are less likely to die in infancy.(4) The cost-effectiveness of large investments in the availability of potable water is now a subject of intense debate. Most field trials that have focused on this question fail to show significant survival gains from the introduction of potable water, despite laboratory evidence that these gains should be occurring. In Malaysia, however, the availability of piped water is related to lower infant mortality, with or without controls for other family and environmental factors. The association is quantitatively small, but it is statistically significant.

Babies in houses without modern toilet sanitation also tend to have higher mortality.(4) This association is considerably stronger than that with piped water.

Most important, both these associations are much stronger for babies who breastfeed little or not at all. Figure 5 shows this relationship for mortality during the second six months of life. The left half of the figure shows the mortality difference due to piped water for babies who do not breastfeed at all, for those who breastfeed with supplementation for their first six months, and for babies who have only breastmilk for their first six months. The mortality rate for babies who do not breastfeed at all is considerably lower in homes with piped water than in homes without piped water. However, the presence of piped water makes no significant difference for the mortality of babies who breastfeed, either with or without supplementation, through their first six months of life.

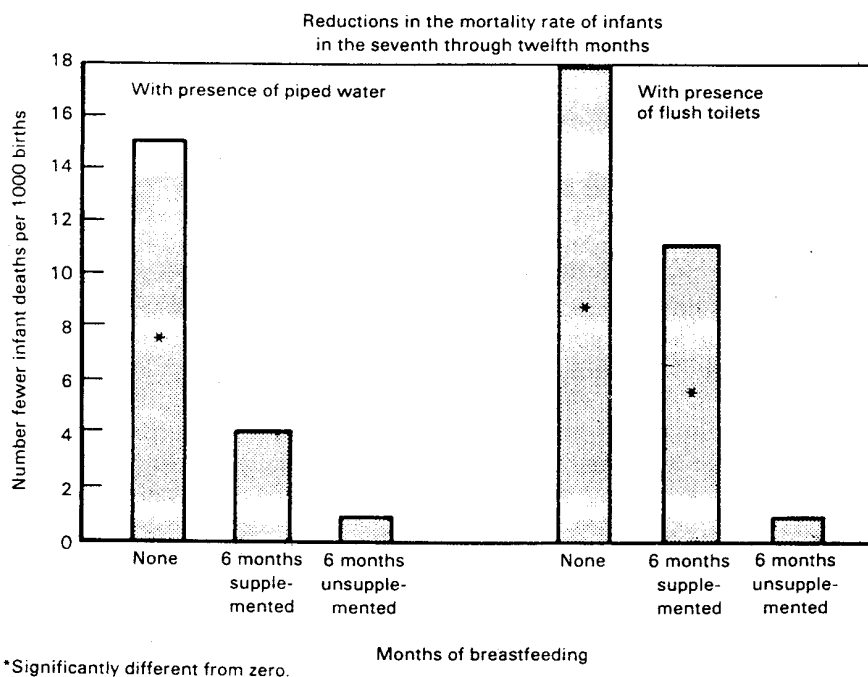


Fig. 5—Water and sanitation influences on infants' mortality depend on breastfeeding

The right half of Fig. 5 shows that the presence of modern toilet facilities has a similar effect. In both cases, modern facilities are associated with a significant difference in infant mortality only for babies who have foods other than breastmilk in their first six months.

These differences presumably arise because babies who do not breastfeed usually have other foods mixed with water. If the water is contaminated—a more likely occurrence with traditional water sources and sanitation methods—then the babies are more likely to die. In actuality, Malaysian babies who do not breastfeed are considerably more likely to live in homes with modern water and sanitation facilities. For them, the lack of breastfeeding is unlikely to be pernicious.

These findings have important implications for the negative results from field trials with potable water: Such investigations should focus on communities where breastfeeding is low or decreasing, hence where good water and sanitation are most likely to matter.

FINDINGS PERTINENT TO SOCIOECONOMIC POLICY

Breastfeeding reduces infant mortality less than previous estimates indicate.(4) The effect is nonetheless substantial and important, at least where water and sanitation are poor, but it is everywhere less than implied by other studies. Most of these studies have attributed to short breastfeeding many infant deaths that were most likely due to other causes. Prevalent diseases, for example, frequently weaken the child so that he stops nursing; then the disease kills him. The halt in breastfeeding is not responsible for the death, though most studies have treated it as such. Policies concerned with infant health and mortality should take account of this finding. Previous estimates suggesting a substantial breastfeeding-mortality link may have incorrectly implied that principal priority should be given to policies to increase breastfeeding. Our findings suggest that policies to reduce mortality by other means are also worth pursuing. The fostering of breastfeeding is important, at least under some conditions, but should be accompanied by other measures to reduce infant mortality.

The higher mortality of babies born to very young mothers has implications broader than those discussed above for family planning programs.(4) This finding implies that policies that raise women's marriage age will reduce infant mortality. Such policies are usually argued only on the grounds of reducing fertility.

Mothers who earn high wages breastfeed less.(6) For such women,

the opportunity cost of nursing a baby is higher than it is for other women who forgo less income when they are with their children. The comparison at the left of Fig. 6 indicates that, when other differences are controlled, almost eight out of ten mothers capable of earning only 20 cents an hour in paid employment breastfeed their infants. For mothers capable of earning one dollar an hour, only 67 percent breastfeed their infants. Interestingly, the right-hand part of Fig. 6 shows that a recent history of agricultural work is strongly associated with more breastfeeding; women with agricultural jobs are even more likely to breastfeed than women who are not employed at all (not shown). Beyond the Malaysian setting, these findings indicate that the availability and characteristics of jobs influence whether women breastfeed. Some jobs—for example, agricultural jobs near to home—are compatible with child care and breastfeeding; others are not. Public policies can influence these job characteristics through taxes, subsidies, and regulation. For instance, by establishing child care facilities where women work, Third World governments might help arrest the decline in breastfeeding associated with nonagricultural work opportunities.

The average birthweight of Indian babies in our sample has been declining since the mid-1960s, while their infant mortality has been rising.(5,4)¹ Birthweight has an important influence on infant mortality. In these data, low-birthweight babies are much more likely to die, even controlling for many other factors including whether the baby is Indian. Hence, Indians' declining birthweight, shown at the top of Fig. 7, is partially responsible for the failure of Indians' infant mortality to fall.

Indians' incomes also appear to be rising less rapidly than the incomes of Malays and Chinese. Furthermore, many Indian women in our sample have not sufficiently increased their use of contraceptives to compensate for a marked reduction in breastfeeding; the result is shorter birthspacing.(3) All of these factors appear to have contributed to the birthweight and mortality trends.

Other potential correlates of infants' health, nutrition, and mortality were investigated with these data, but many failed to emerge as significantly related. One such correlate that is of widespread interest is the commercial merchandising of infant formula. Although the MFLS is not ideally suited to investigate the possibility that this merchandising has contributed to breastfeeding declines, *we find no relationship between a woman's breastfeeding and the availability and price of infant formula in the community where she lives.*(6) It is possi-

¹The rate rises in the 1970s in the MFLS sample but is nearly level in the official vital statistics.

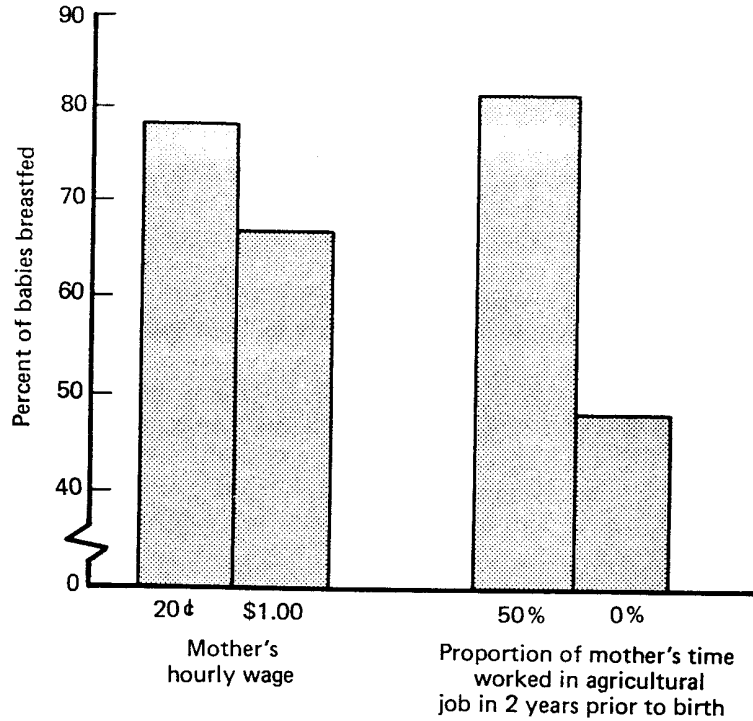


Fig. 6—Mother's work and breastfeeding

ble that the relationship exists, and that our data and statistical methods cannot uncover it. But in any case, our research offers no support for the hypothesis. Rather, it shows that in Malaysia, breastfeeding declines began well before the beginning of wide-scale commercial merchandising of infant formula. These declines appear to be due instead to improved nonagricultural work opportunities for women and to other socioeconomic changes.

IMPLICATIONS FOR RESEARCH

Although we have focused on the policy implications of our analyses, the findings also have some methodological implications for future research to further inform policy. First, retrospective life-history surveys can be much more useful than commonly thought. They

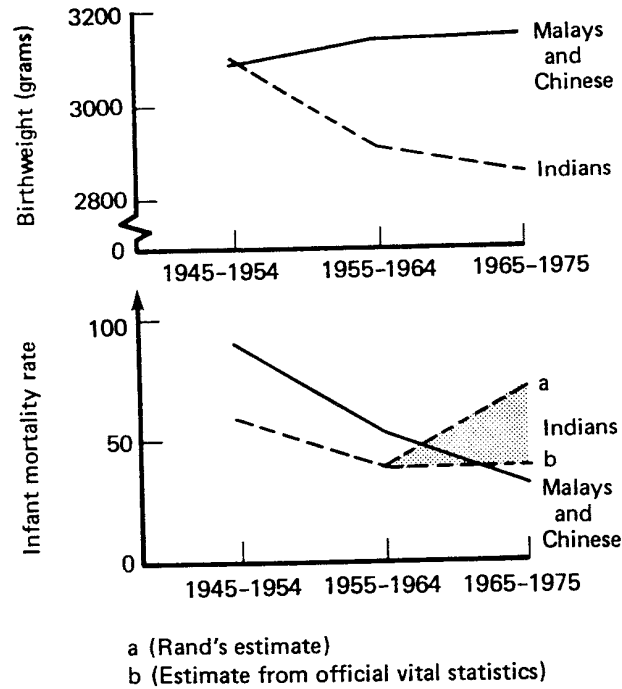


Fig. 7—Ethnic differences in birthweight and infant mortality trends

should be considered for documenting more than just past births and deaths, to which they have been nearly always restricted. They should also be used to establish baseline data on trends at the start of interventions and experiments, to monitor changes in the public health outcomes and the demographic and economic variables that are the target indicators for these interventions, and to document changes in control variables. To their low cost and quick availability, compared with prospective panel data, must now be added their quality. While decidedly less reliable than good panel data, retrospective life-history data can be good enough for many important purposes.

Second, outcomes that result from interplays of behavioral, biomedical, and institutional factors are most reliably and productively studied in data that document all three aspects and by researchers whose expertise spans these areas. In our case, at least, biomedical and behavioral scientists have produced more together than they could

have separately. Our experience may be an exception, but then real collaboration may not have been tried enough yet to establish a rule.

Third, very disaggregated analysis appears to have payoffs, even at the expense of working with small subsamples. Examining the experiences of individual infants and following them through succeeding phases of infancy have produced new findings. So have our separate analyses of the initiation and the lengths of both unsupplemented and supplemented breastfeeding.

RECOMMENDED PROGRAM AND POLICY INITIATIVES

This project has yielded a number of findings that are consistent enough with those of other studies, or are sufficiently supported by biomedical or behavioral theory, as to constitute reliable inputs for program and policy initiatives:

- *Water and sanitation improvements will have their greatest impact on public health if focused on areas where mothers breastfeed little or not at all, or where the mothers appear, on the basis of research there or elsewhere, to be at risk of reducing their breastfeeding in the near future.* These findings are consistent with theory and are so strongly robust in this study that we believe they have immediate program implications, even though they are new.
- *Policy and program initiatives of whatever type to increase breastfeeding will have their greatest effect in reducing infant mortality if applied selectively to populations whose water and sanitation systems are poor.* Present theory expects some benefit from breastfeeding even in infants with access to pure water, but our estimates strongly indicate that these benefits are relatively small.
- *Family planning activities should be integrated with maternal/child-health services in order to encourage breastfeeding.* The advantages and disadvantages of such integration in the Third World have been much debated. Our research suggests one benefit of integration that has not entered into the debate: In Malaysia, availability of integrated clinics appears to be associated with increased initiation of breastfeeding, even while it is also associated with use of modern contraceptives.
- *Field investigations should move quickly to identify the practices of private maternity clinics in Malaysia that discourage*

breastfeeding. Something may be learned in that process that can correct these procedures and may be relevant in other maternity institutions as well.

- *Family planning services should focus on very young and older women to reduce infant mortality, as well as to reduce fertility*. Even though our interpretation of the causes of increased infant mortality among very young and much older mothers may be new, the literature contains ample evidence to substantiate our finding that these mothers tend to lose their infants more than other mothers.



