Are Improvements in Child Health Due to Increasing Status of Women in Developing Nations?

Tim B. Heaton

Department of Sociology

Brigham Young University

Provo, Utah 84602

Phone: 801 422-3280

e-mail: tim_heaton@byu.edu

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Different lines of research concur that improving the status of women will benefit their children's health. Whether the perspective focuses on available resources and optimal use of those resources at the household level, the biology of reproduction, the primacy of women as care-givers for children, the economic position of women, or macro-level contexts that structure the options available to women; there is broad consensus that enhancing the position of women improves the lives of their children. Despite this consensus, generalization based on existing literature is problematic for a variety of reasons. First, there is not a generally accepted approach to defining and measuring women's status. This is complicated because women function in multiple domains that each have implications for children. Several studies include a small number of measures of women's status from only one domain making it difficult to determine which aspects of women's status are most relevant. Second, many studies lack generalizability because they only consider one social context. Political, economic and cultural contexts exhibit wide cross-national variation. Finally, many conclusions are based on cross-sectional data that limit conclusions regarding change in women's status and change in children's health. This research addresses each of the limitations by including a broad sample of countries (n=28) to increase generalizability, with data at two or more points in time to enable examination of change, and measures of women's status across several domains to give a more complete view of dimensions of women's status.

Various frameworks have been developed that directly or indirectly link the health of children to the status of women (UNICEF, 1998; Smith et al., 2003; Heaton, et.al, 2005; Landale, et al. ,2013). These frameworks recognize that women's status encompasses several aspects of their lives including health knowledge, household decision-making, freedom of mobility, economic

security, and emotional security (Thapa and Niehof, 2013; Smith, et al., 2003). For example, the UNICEF model stipulates two immediate causes of child death and under-nutrition: namely inadequate dietary intake and disease (UNICEF, 1998). Underlying causes at the household level include insufficient access to food, inadequate maternal and child practices, and the lack of good water, sanitation and health care. Each of the frameworks imply that women have a variety of different roles that each impact children's health and most empirical investigations include several measures of status, but do not associate these measures with the roles that women play. From a policy perspective, however, it makes sense to focus on roles because different policy domains impact different roles. Public health agendas focusing on maternal health and family planning are centered on the biological aspects of motherhood. Concern over decision making and women's position within the home is targeted to women's roles as caregivers. Micro-finance and economic reform are most applicable to women's roles are providers. The movement to enhance women's rights and political representation is more attuned to the social context within which women's roles are defined and performed. Our fundamental hypothesis is that when women have more resources and greater empowerment in their roles as biological mothers, care-givers and providers, and when the social context promotes rights, representation and investment in women then children will be more likely to survive and receive adequate nutrition.

Women as biological mothers

Children's health depends on the health of their mothers: directly from conception to birth and indirectly during early childhood. When women have lower status, their health has lower priority (Gill, Pande and Malhotra, 2007) and children's health is affected. The health of children begins in utero, if not before. Expectant mothers who have better health give birth to healthier children. Lower status increases the risk of child-bearing under undesirable

circumstances, and unhealthy mothers give birth to children with more health problems (Gill, 2007). Because a large majority of children in the developing world are breastfed for several months, the nutritional status of new mothers influences dietary intake of children. The mother's health also influences her ability to care for children. In households where the mother is unhealthy, other people may take over more responsibility for childcare and giver lower quality care.

Although women's health status has improved over the last few decades, women still face serious health risks because of persistent disadvantage (Grown, 2005). We consider two aspects of mother's status that directly impact their role as biological mothers. First, women's control over reproduction should be beneficial for their children for a variety of reasons. Birth spacing is of particular importance because longer intervals between births give the mother's body time to recover from the demands of pregnancy (Ricci & Becker, 1996; Frost et al., 2005; Rutstein, 2000; Rutstein, 2008). The risk of both stunting and mortality increases with rapid childbearing (Hobcraft, McDonald, & Rutstein, 1983; Forste, 1994; Rutstein, 2008; Cleland & van Ginneken, 1988). Second, health care at birth and during early childhood is a resource that directly benefits mothers and their children. Access to health care is associated with better nutritional outcomes and lower mortality (Pridmore & Carr-Hill, 2010).

Women as care-givers

Women also provide the bulk of the care for children including preparing food, psycho-social care, hygiene, and health care (Smith et al., 2003). Thus, women who can make decisions about household resources and are free from intimidation should be better able to care for their children and for themselves. Ample literature demonstrates that women who have more power to make

household decisions have better health-care (Allendorf, 2007; Blanc, 2001) and are more likely to have planned what to do in case of a maternal health emergency (Becker, et al, 2006). Too much autonomy, however, may not be beneficial if it reduces the husband's involvement in their children's health (Thapa and Niehof, 2013). Indeed, the concept of autonomy may be too Western and individualistic to accurately describe gendered influence on women's reproductive health (Mumtaz and Salway, 2009). Preliminary analysis of the data we use here indicates that exclusive decision making by the husband is not conducive to children's health, but that husband involvement in decision making is beneficial.

Intimate partner violence is negatively associated with women's physical and emotional health (Ellsberg, 2008). Pregnancy may increase the women's risk of domestic violence and domestic violence is associated with various negative health consequences for the mother and child including unwanted pregnancies, complication's with pregnancy and delivery, inadequate prenatal care, and depression (Gill, 2007; Akyuz, et al, 2012). These outcomes put children at risk directly when mothers are less able to seek healthcare for their children and indirectly when mothers are less able to provide adequate care for their children.

Women as providers

In some cases women are also providers. Women's employment can have both harmful and beneficial consequences (Gill, et.al., 2007). Children may receive inferior care when the mother is not at home, and the stresses of employment may detract from parenting. On the other hand, employment can give women higher status and income, each of which can benefit children. Work related autonomy, as measured by white-collar employment, gives women greater control in other aspects of their lives including reproductive choice and access to health care (Miles-Doan and Brewster, 1998).

Education as a general indicator of status

Education is a key measure of status because it has the potential to benefit women in each of their roles. More educated women are more likely to have better health (Grown, 2005), control over reproduction, higher status in the home, and to fare better in the labor-market (Levine, et al., 1991; Heaton, et al., 2005). Frost and colleagues (2005) found that maternal education influenced child nutritional status primarily through the pathways of socioeconomic status and modern attitudes regarding health care. Education may also increase cognitive ability (Glewwe, 1999), human and cultural capital (Vikram, Vanneman, & Desai, 2012) and use of modern health services (Pena, Wall, & Persson, 2000; Frost et al., 2005; Kuate-defo, 1996; Fotso & Kuate-defo, 2005; Smith et al., 2003). Educated mothers are better able to access, understand, and respond to health information designed to improve child health. For example, research suggests that schooling enables mothers to make more informed decisions about nutrition, hygiene and preventative care (Fotso & Kuate-defo, 2005; Smith et al., 2003). Educated women tend to be healthier, and children benefit directly from maternal health. Women who have more education relative to their husband's also have more bargaining power (Beegle, et al., 2001). Women who are more educated also fare better in the labor market. Most studies linking education and child mortality are based on cross-sectional data. Using data from 175 countries between 1970 and 2009, Gakidou et. al. find that a one year increase in education of women in the reproductive ages is associated with a 9.5% decline in child mortality.

Status of Women in society

The context within which women give birth and care for children matters because the broader environment not only provides opportunities and resources, but also generates norms regarding

activity within households (Smith, et al, 2003). Social and economic policies, particularly when they are designed to support families, can benefit children's health (Berkman and O'Donnell, 2013). Public policy can provide a supportive environment, resources and cultural support for women in each of the roles discussed above. Berkman and O'Donnell (2013) summarize evidence that policy can directly benefit women's health by reducing stress, and can facilitate women's roles as care givers and providers. Policies supporting maternal health directly impacts children's health because inadequate care during delivery affects mother and child, and because children do not fare as well if they are cared for by someone other than their biological mother (Grill, et al. 2007). A child's risk of dying or being stunted increases if the mother dies (Gill, 2007). Maternal mortality is also associated with a decline in the household's economic resources and negative psychological and social consequences. Higher maternal mortality also indicates that women's health is not adequately addressed in general.

Guaranteeing women's property rights has important welfare effects (Grown, 2005).

Controls

We include several control variables that may also influence children's health. These include urban/rural residence, age of the child, presence of the husband and husband's education, an indicator of household wealth and household size. Per capita GDP is included as an indicator of level of development.

Data and Analysis

Data for this analysis was extracted from the Demographic and Health Surveys (http://www.measuredhs.com/). These surveys have the advantages of comparability across countries and time, and include detailed measures of reproductive health. All countries that have

at least two surveys since 2000 and contain anthropometric data on children are included in the analysis. This survey includes basic household information and a questionnaire for women of child-bearing age. Focusing on children born in the last 5 years, a birth history includes date of birth, survival status, date of death for children that did not survive, and anthropometric data for living children.

Measures reflecting women's control over reproduction include age at birth of the first child, whether the child was wanted, whether the mother has an unmet need for family planning at the date of the survey and the duration of the preceding birth interval for higher order births. Access to health care at the time of delivery is measured by a dichotomous variable indicating whether a skilled birth attendant (doctor or nurse) was present at the birth. Household decision making is measured by asking women who makes decisions regarding the respondent's health care, major purchases and visits to friends and relatives. An index was created by summing the number of decisions that are made by the husband alone (alpha=.750). Domestic violence is measured by yes/no questions about acceptability of wife beating if the wife goes out without telling the husband, neglects the children, argues with the husband, refuses to have sex, or burns the food (alpha=.858). Mother's economic position is measured by whether she works, if she has a white collar job, and if she controls the income from her job.

National level indicators include a women's rights scale measuring the degree to which countries have laws supporting women's rights including education, family and physical security, and enforce those laws (scale2 at http://www.womanstats.org/), the maternal mortality rate (http://data.worldbank.org/indicator), the proportion of legislators who are female (http://data.worldbank.org/indicator), per capita GDP (http://data.worldbank.org/indicator), and

the ratio of females to males aged 7-15 enrolled in school (calculated from DHS surveys http://www.measuredhs.com/).

To measure change we include the year mothers were interviewed as a covariate. The coefficient for year shows the overall trend in the outcome. The baseline model includes year and, for nutritional status, age of the child in months. We then introduce measures of women's status and controls. If the coefficient for year is reduced when other variables are added, then we conclude that the added variables can account for changes in child's health status. Fixed effects models are estimated in order to adjust for any unique country level characteristics that influence children's health and for the inter-correlation within country.

This paper examines two key measures of child health: child mortality, and height-for-age Z-score (HAZ). Each outcome is a well-established measure of child health. Under-nutrition is still common in low-income countries, and contributes substantially to poor development in more than 200 million children worldwide (Black et al., 2008). Under-nutrition deters motor development, cognitive achievement, and schooling, and is a common determinant of mortality (Black et al., 2008; Breman et al., 2004; Crookston et al., 2011; Kuklina, Ramakrishnan, Stein, Barnhart, & Martorell, 2004; Victora et al., 2008).

Results

Figure 1 shows the pattern of under-nutrition for children under age 5. New born children are close to the WHO norm for height, but their growth lags as they age. By age 2, the average z-score is close to cut-off for stunting (-2 standard deviations). There is a bump up at 2, but this is probably due to change in measurement, and then a much more gradual decline through age 5. Nutritional status shows improvement over time, but more improvement in the first half of the

decade. Figure 2 shows comparable information for mortality. Over 12 % of the reported births between 2000 and 2003 did not survive until their 5th birthday. As with nutritional status, survival improved over the decade. Subsequent analysis is designed to assess how much of the improvement in nutritional status and survival can be explained by improvement in the status of women.

Table 1 provides descriptive statistics for variables in the analysis. On the average mothers have not completed primary school and begin child-bearing a little after their 19th birthday. The average spacing between births is over 3 years. Thirteen percent said they did not want to have their last child at the time it was born and 27 % report unmet need for family planning. Less than half had a skilled birth attendant at their last birth. About a third of the major decisions are made exclusively by the husband and wife beating is justified in some instances. Nearly two-thirds of the mothers work, but only 17 percent have white collar jobs and only 22% have control of the income they earn. In short, women's status as measured by education, control over reproduction, access to maternal health, participation in decision making, freedom from violence and having a high status job with control over income leaves substantial room for improvement. National level indicators also indicate that women's rights are not fully legislated and enforced, maternal health care is inadequate and women are vastly underrepresented in the political process. However the ration of females to males enrolled in school is near unity and preference for male children is relatively low.

These indicators of women's status can only explain change in child health if they are also changing. To assess the degree of change, we also report each covariate's correlation with survey year. The greatest changes are observed at the national level. There is increasing recognition and enforcement of women's rights, maternal mortality is declining, more women are holding

legislative positions and the ratio of females to males enrolled in school is improving. Some changes at the individual level are less impressive, but still suggest progress. Women's education is improving, women have greater access to family planning and are spacing children farther apart, there is less exclusive decision making by the husband, and acceptability of violence is declining. Changes in age at first birth, unwanted births, female employment characteristics and preference for male children show very little change.

Models predicting nutritional status of children are reported in Table 2. The coefficient for year indicates that height for age is improving by .02 standardized points per year. At this rate, it will take decades before the average child reaches the WHO standard for healthy growth, but there is still noticeable improvement. Consistent with prior research, some of the best individual-level predictors of better nutrition are mother's education, spacing children farther apart, and delivering with a skilled birth attendant. There is also some benefit if the mother waits longer to begin childbearing. Children are a little worse off if mothers work but this is neutralized if the mother has a white-collar job and control over her income. Finally, there is some benefit when wife-beating is not justified and when the mother has control over her reproduction. Once these factors are included, the degree of exclusive decision-making by the husband does not have a meaningful impact on nutritional status. In combination, these measures of women's status account for 38% of the improvement in child nutritional status that is reflected in the value of the coefficient for year (1-1.44/2.31=.377).

National level indicators of women's status are also associated with children's nutritional status. In particular, enforcement of women's rights, female representation in the legislature and female enrollment in school are each beneficial. The maternal mortality rate and son preference are not significantly related to child nutrition. When the national indicators of women's status are

included, the coefficient for year is close to zero. Ninety percent of the improvement in child nutritional status is associated with improvements in the status of women at the household and national level. Most of this is because of six factors: mother's education, duration of the preceding birth interval, presence of a skilled birth attendant, women's rights, the percentage of females in the legislature and greater equality in school enrollment. When these six variables are included, the coefficient for year is reduced by 84%.

Coefficients for control variables indicate that children have better nutrition when they live in wealthier households, their fathers are more educated and they live in urban areas. When these controls are added, some other coefficients shift. The coefficient for mother's education becomes smaller because mother' and father's education are highly correlated. The coefficient for skilled birth attendant also becomes smaller because having a skilled birth attendant is correlated with household wealth and urban residence. The general conclusions are not altered, however, by inclusion of controls. Because per capita GDP is higher correlated with maternal mortality and the women's rights scale, it is not included in the model.

Since a few countries do not include the violence variables, we report separate analysis with violence included. Acceptability of wife beating is negatively associated with children's nutritional status. Since violence is becoming less acceptable, this change is also associated with improved child health.

Comparable results are reported for child survival in Table 3. The most salient household level predictors of child survival are maternal education and duration of the preceding birth interval. Unmet need for family planning, delivering with a skilled birth attendant and acceptability of violence are also important. At the national level, lower maternal mortality and greater equality

in the education are most crucial for child survival. Inclusion of all measures of women's status reduces the coefficient for year by 47%, but most of this reduction can be attributed to maternal education, longer birth spacing, lower acceptability of violence, reduced maternal mortality and more equality in the education system.

Conclusion

Key indicators of child health show improvement in the last 13 years in developing nations. Much of this improvement—90% of the increase in nutritional status and 47% of the reduction in mortality—is associated with improving status of women. Increased maternal education, control over reproduction, freedom from violence, access to health care, legislation and enforcement of women rights, greater political representation, equality in the education system, and lower maternal mortality are improving children's health. These results imply that further advancement of women's position in society would be beneficial. And there is ample room for advancement. A majority of women in our sample have not completed primary school, over a fourth have unmet need for family planning, fewer than half delivered with a skilled birth attendant, and nearly half say that wife beating is justified in some cases. Only 15 percent of legislators are women, legislation of women's rights is lacking and unenforced is common, and delivering a baby is still a risky event. At least in a couple of areas, indicators are more positive. Enrolment of female children is approaching male enrollment in many countries and son preference is not common in many contexts.

Some indicators included here are not particularly salient for children's health. Most notably, exclusive male decision making has minimal impact of children's health. Measures of female employment, status of job and control of income have only modest relationships with child

health, as is also the case for son preference. Of course, the caveat that conclusions are only as good as the measures on which they are based is apropos.

In sum, achievement of goals to improve child nutrition and reduce child mortality is contingent on improvement of key dimensions of women's status. This improvement needs to occur both at the household level and the national level.

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Table 1. Descriptive Statistics			
Variable	Mean	Standard Deviation	Correlation with year
Mother's Education	1.38	1.47	.103
Age at 1st birth	19.4	3.8	.027
Length of preceding birth interval	40.3	21.2	.066
% Wanted no more children	13.2	33.9	-.037
% Unmet need for family planning	27.3	44.6	-.066
% Skilled birth attendant	46.8	49.9	.086
# decisions made by husband	1.03	1.19	-.058
Violence scale	1.44	1.78	-.164
% mothers employed	65.2	47.6	.021
% white collar	17.4	37.9	.033
% control income	22.6	41.8	-.037
Women's rights scale	3.02	.508	-.304
Maternal mortality rate	423.	231.	-.374
% legislators female	15.0	10.4	.344
Ratio females/males in school	96.6	7.1	.370
Preference for male children	.093	.212	-.014
% husband present	72.8	44.5	-.022
Husband's education	5.42	4.77	.077
# household possessions	1.44	1.32	.089
# household members	6.81	3.93	.017
% urban	30.9	46.2	-.004
Per-capita GDP	1068.	1260.	.239

Table 2. Fixed Effect Regression Models Predicting Nutritional Status (Height for age z-score). (Shaded coefficients are not statistically significant)

	All countries				Countries with violence scale	
Variables in the Model	1	2	3	4	5	6
Survey year	2.31	1.44	.22	.38	2.31	.74
Child's age	-1.71	-1.64	-1.64	-1.66	1.71	-1.70
Mother's education		12.52	12.56	6.90		12.62
Age at 1st birth		1.32	1.31	1.15		1.33
Unwanted		-4.83	-4.79	-4.75		-5.26
Unmet need		-5.64	-5.53	-4.82		-5.63
Prior birth interval		.46	.46	.42		.45
1st birth		-.81	-.78	-.05		-1.85
Skilled birth attendant		21.78	21.48	13.70		22.16
Decisions by husband		-.18	-.26	-.15		.20
Violence scale						-1.98
Mother works		-10.82	-10.41	-6.55		-10.92
White collar		16.28	16.64	10.88		17.13
Control's income		6.10	5.44	2.98		5.38
Women's rights scale			-4.57	-2.51		-11.31
Maternal mortality			-.01	-.01		.01
% females in legislature			.45	.45		.37
Females/males in School			.71	.43		.78
Preference for sons			-8.35	-14.40		.03
Possession index				8.86		
Husband education				1.50		
Husband present				.39		
Household size				.32		
Urban				12.87		

Table 3. Cox regression predicting Child Survival(dummy variables included for each country). (Shaded coefficients are not statistically significant)

	All Countries				Countries with violence scale	
Variables in the Model	2	3	4	5	6	7
Survey year	.935	.941	.972	.969	.936	.971
Mother's education		.836	.835	.877		.845
Age at 1st birth		.986	.986	.985		.985
Unwanted		.964	.965	1.003		.957
Unmet need		.832	.830	.850		.822
Prior birth interval		.989	.989	.989		.989
1st birth		1.105	1.104	1.005		1.115
Skilled birth attendant		.847	.853	.901		.856
Decisions by husband		1.005	1.006	1.021		1.004
Violence scale						1.029
Mother works		1.091	1.085	1.072		1.080
White collar		.941	.929	.962		.936
Control's income		1.025	1.036	1.044		1.043
Women's rights scale			1.022	1.016		.931
Maternal mortality			1.001	1.001		1.001
% females in legislature			.987	.987		.990
Females/males in School			.991	.991		.995
Preference for sons			.751	.727		.522
Possession index				.946		
Husband education				.978		
Husband present				.862		
Household size				.932		
Urban				.929		

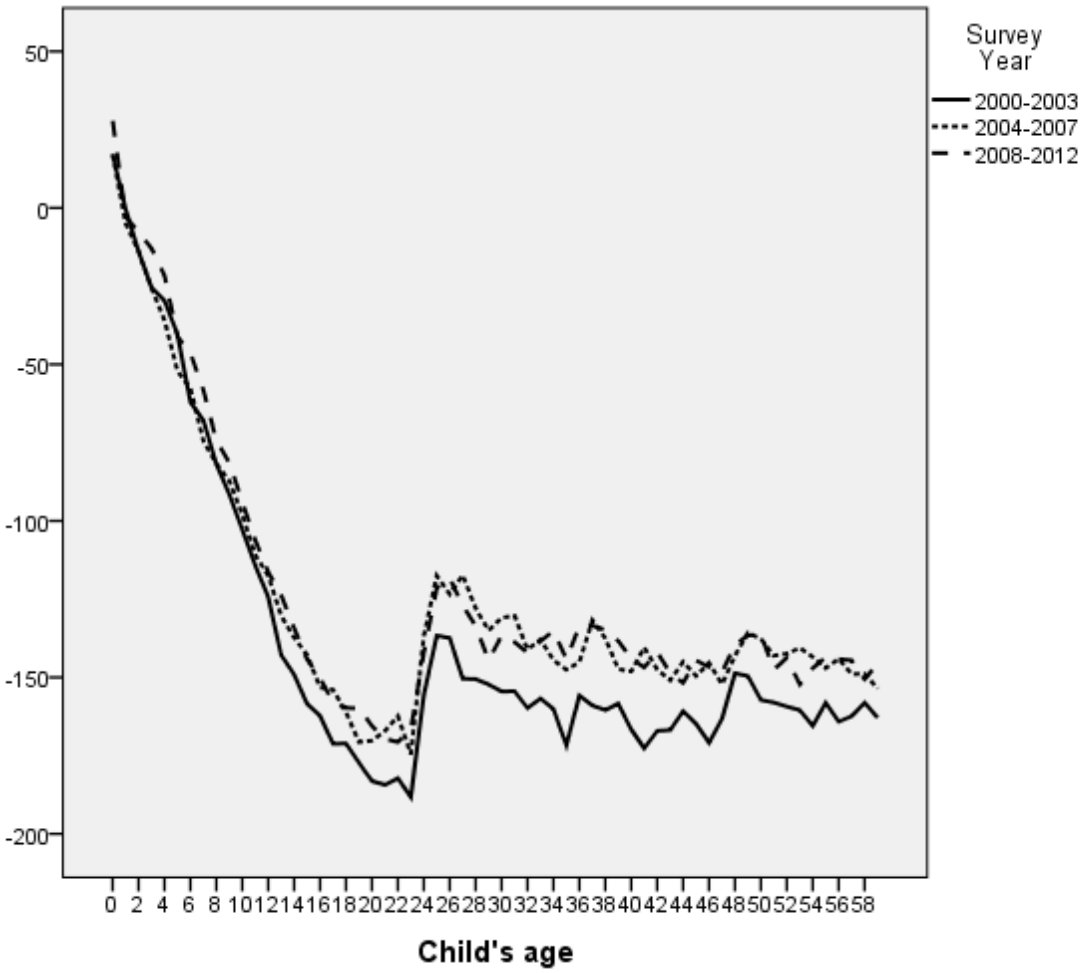

Figure 1. Height for age z-scores by child's age and year of the Survey.

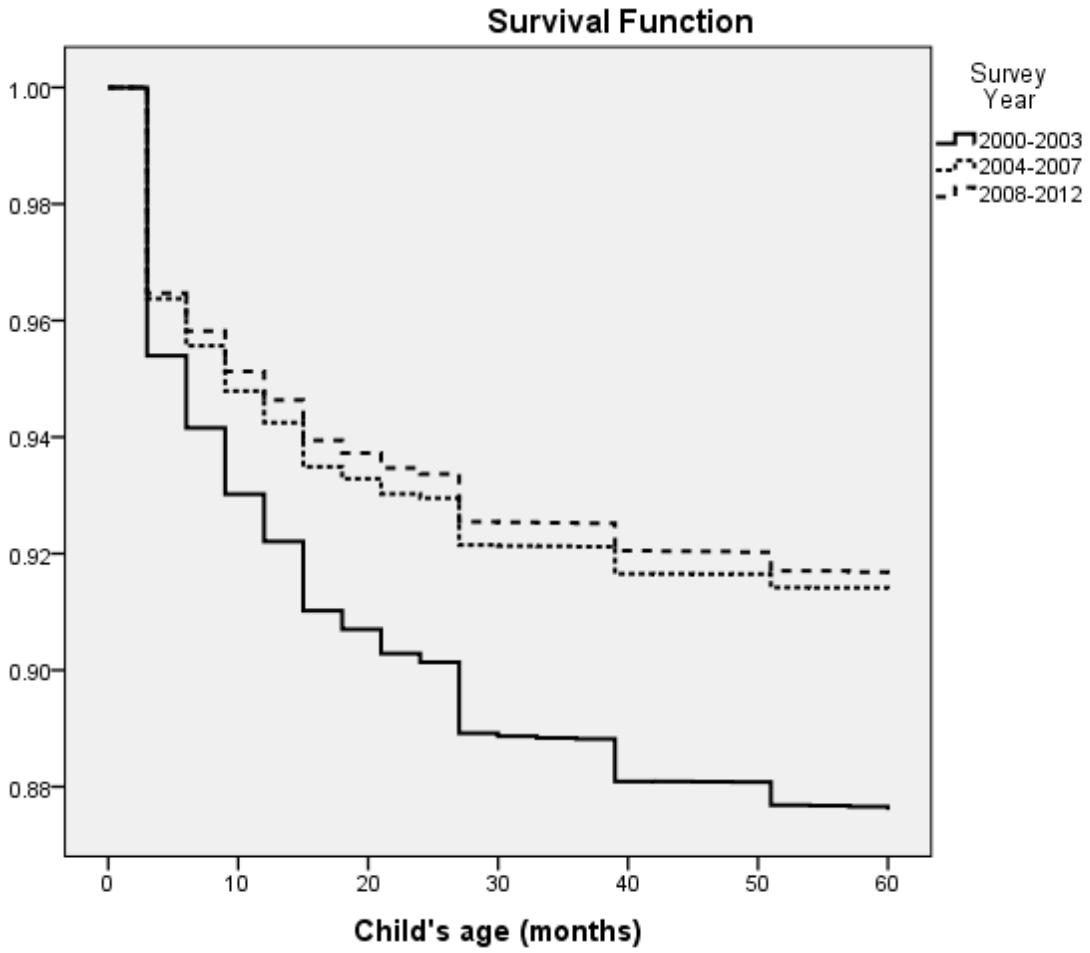

Figure 2. Child Survival by Year