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Death and Desirability: Retrospective Reporting of Unintended Pregnancy after a Child's Death

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Abstract

Social scientists have long debated how to best measure pregnancy intentions. The standard measure relies on mothers' retrospective reports of their intentions at the time of their conception. Because women have already given birth at the time of this report, the resulting children's health —including their vital status—may influence their mothers' responses. We hypothesize that women are less likely to report deceased children were from unintended pregnancies, and this may explain why some longitudinal studies have shown that children from unintended pregnancies have lower survival, but cross-sectional studies produce counter findings. Using Demographic and Health Survey data from 31 sub-Saharan African countries, we confirm that mothers are less likely to report deceased children resulted from unintended pregnancies compared to surviving children, although the opposite is true for unhealthy children, who mothers more commonly report were from unintended pregnancies compared to healthier children. The results suggest that mothers (1) revise their recall of intentions after the traumatic experience of child death and/or (2) alter their reports in the face-to-face interview. The study challenges the reliability of retrospective reports of pregnancy intentions in high mortality settings, and thus our current knowledge of the levels and consequences of unintended pregnancies in these contexts.

Keywords

Unintended Pregnancy; Measurement; Child Mortality; Child Health; sub-Saharan Africa

Unintended pregnancies[1] bear sizeable social, financial, physical, and emotional costs for women and their families (for a comprehensive review, see Gipson, Koenig, and Hindin 2008), making them an important component of social stratification. Because the extent of our knowledge on the causes and consequences of unintended pregnancy hinges on the accuracy with which we measure this inherently complex phenomenon, for decades social scientists have debated how to best measure pregnancy intentions.

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[1]In this paper, we use the term "unintended" to denote pregnancies that women report were mistimed or unwanted. In supplemental analyses, we differentiate between these pregnancies to ensure that key study findings are consistent for both types of unintended pregnancies.

The standard approach in nationally representative surveys is to ask mothers to think back to the time they became pregnant with their child and report whether the pregnancy was (1) wanted then (intended) or (2) wanted later or (3) not at all (unintended).[2] Scholars have raised concern about various aspects of this approach, ranging from its specificity to individual pregnancies (Casterline and El-Zeini 2007) to its discrete categorization of complex emotions (Bachrach and Newcomer 1999), but the most salient concern relates to the issue of timing. Most surveys rely on mothers' *retrospective* recall of their intentions after the pregnancy has already ended in the birth of a child, allowing women to possibly engage in *ex post* rationalization (Lloyd and Montgomery 1996).[3] Longitudinal studies show that women's reports of intentions of the same pregnancy change when asked at different stages of reproduction (e.g., before conception, during pregnancy, and after giving birth) (Gipson, Hossain and Koenig 2011, Joyce, Kaestner and Korenman 2000a, Koenig et al. 2006, Westoff and Ryder 1977, Yeatman, Sennott and Culpepper 2013). Whereas women who revise their reports typically shift from unintended to intended over time (Bankole and Westoff 1998, Joyce, Kaestner and Korenman 2000a, Joyce, Kaestner and Korenman 2002, Koenig et al. 2006, Poole et al. 2000, Williams and Abma 2000), select studies have documented revision in the opposite direction (Guzzo and Hayford 2014, McClelland 1983, Rosenzweig and Wolpin 1993).

As depicted in Figure 1, key maternal experiences that occur between the time of conception and the time at which women retrospectively report their pregnancy intentions—including children's health experiences—could instigate this revision process (Bankole and Westoff 1998, Barber, Axinn and Thornton 1999, Koenig et al. 2006, McClelland 1983, Williams and Abma 2000). Despite this, the large literature on unintended pregnancy and child health —especially in low-income contexts—relies mostly on cross-sectional data that measure child health outcomes *and* mothers' retrospective reports of pregnancy intentions at a single point in time (e.g., (Jensen and Ahlburg 1999, Jensen and Ahlburg 2002, Marston and Cleland 2003, Montgomery et al. 1997, Shapiro-Mendoza et al. 2005), leaving open the possibility that children's health outcomes influence mothers' reports. Cross-sectional studies of unintended pregnancy and child mortality may be particularly susceptible to endogeneity. The death of a young child is a traumatizing and stigmatizing experience that may lower a mother's likelihood of reporting that the deceased child resulted from an unintended pregnancy, either because she internally recalls the pregnancy in a positive light or she revises her report in the face-to-face interview to avoid blame.

In this paper, we examine the relationship between child mortality and mothers' retrospective reports of pregnancy intentions in the context of sub-Saharan Africa, a world region where rates are high for both unintended pregnancy (Sedgh, Singh and Hussain 2014) and child mortality (Liu et al. 2015). We use cross-sectional Demographic and Health Survey (DHS) data from 31 sub-Saharan African countries; these data feature detailed

[2]This approach is used in domestic (e.g., National Survey of Families and Households, National Survey of Family Growth, National Longitudinal Survey of Youth) and international (e.g., Demographic and Health Survey) surveys and, as a result, is the basis of the vast majority of our knowledge on the levels, causes, and consequences of unintended pregnancies worldwide.

[3]Of course, the concern with *ex post* revision of retrospective reports is not limited to studies on unintended pregnancy; it has been noted in reporting issues as diverse as self-rated health (Vuolo et al. 2014), stress-related coping behaviors (Belli 1998), and alcohol consumption (Searles et al. 2002).

information on children's health and survival and mothers' retrospective reports of pregnancy intentions. Focusing on women's most recent birth, we estimate country-level fixed-effects logistic regression models. The models produce within-country estimates of women's likelihood of reporting a pregnancy was unintended (versus intended) based on the resulting child's vital status at the time of the survey. We also explore whether the age at which the child died influences mothers' likelihood of reporting the pregnancy was unintended. The results speak to the limitations of retrospective measures of pregnancy intentions in settings where child mortality is high and suggest that research relying on retrospective reports will underestimate the true impact of unintended pregnancy on child death.

Unintended Pregnancy and Child Outcomes

Across a diverse set of contexts, unintended pregnancies have been linked to a wide array of disadvantages for women and their families. In low-income countries where high rates of infectious disease, limited medical infrastructure, and food scarcity pose risks to young children's health (Grantham-McGregor et al. 2007), extensive research has examined whether children born from unintended pregnancies are especially prone to poor health and even death (Gipson, Koenig, and Hindin 2008).

As depicted in Figure 2, children from unintended pregnancies may be at risk of subsequent health problems due to their mothers' unhealthy behaviors and/or lower investment in their well-being.[4] In terms of the former pathway, there is some evidence that women engage in less healthy prenatal and postnatal behaviors when unintentionally pregnant. Drawing on evidence from the United States, for instance, women report higher rates of smoking, alcohol use, and drug use during and after pregnancies that were unintended versus ones that were intended (Cheng et al. 2009, Joyce, Kaestner and Korenman 2000a, Kost and Lindberg 2015, Than et al. 2005, Weller, Eberstein and Bailey 1987). Unintended pregnancies are also associated with risky behaviors in low-income countries, including giving birth without medical supervision (Marston and Cleland 2003), which places children at higher risk of birth complications and infant death (Lawn et al. 2005).

Children from unintended pregnancies also receive fewer parental investments compared to their peers born from intended pregnancies (Gipson, Koenig and Hindin 2008), including less parental time and attention (Barber, Axinn and Thornton 1999, Barber and East 2009, Barber and East 2011). Several cross-sectional surveys show that children from unintended pregnancies are breastfed less (Berra et al. 2001, Chinebuah and Pérez-Escamilla 2001, Hromi-Fiedler and Pérez-Escamilla 2006, Joyce, Kaestner and Korenman 2000a, Korenman, Kaestner and Joyce 2002, Kost, Landry and Darroch 1998, Matějček, Dytrych and Schüller

[4]In high-income countries, poor, less-educated women face disproportionally higher risk of experiencing unintended pregnancy compared to their socioeconomic advantaged peers, which then puts these women at further risk of poverty (Mosher, Jones, and Abma 2012). Thus, in high-income countries like the United States, socioeconomic inequalities are a key part of the link between unintended pregnancy and child well-being, both as a confounder and as a mechanism. Although widespread poverty and the lack of medical infrastructure contribute to the overall higher rate of unintended fertility in low- versus high-income countries (Sedgh, Singh, Hussain 2014), there is little evidence of a socioeconomic gradient in risk of unintended fertility among sub-Saharan African women (Ikamari, Izugbara, and Ochako 2013), which is why we do not include it in our conceptual model here. However, we do account for socioeconomic status in all multivariate models.

1978, Pérez-Escamilla et al. 1999, Taylor and Cabral 2002) and receive less preventative healthcare (Marston and Cleland 2003), including childhood immunizations (Cheng et al. 2009, Eggleston 2000, Magadi, Madise and Rodrigues 2000, Marston and Cleland 2003), compared to their peers born from intended pregnancies.

Extending evidence of an association between unintended pregnancy and maternal behaviors, longitudinal studies further confirm that children from unintended pregnancies face long-term health risks, ranging from low birth weight (Myhrman 1988) to overall poor health and development in later childhood (Hummer, Hack and Raley 2004), with some direct evidence that unhealthy maternal behaviors explain these adverse outcomes (Kost, Landry and Darroch 1998). Children from unintended pregnancies even experience a higher risk of death in settings as diverse as the United States (Bustan and Coker 1994), Bangladesh (Chalasani, Casterline and Koenig 2007), and India (Singh, Singh and Mahapatra 2013). Though selection could account for some of this association (Bishai et al. 2015), these studies offer compelling evidence that children from unintended pregnancies experience long-lasting, severe consequences.

Cross-sectional studies generally produce findings that align with longitudinal evidence that children from unintended pregnancies experience worse subsequent health (Eggleston, Tsui and Kotelchuck 2001, Jensen and Ahlburg 1999, Jensen and Ahlburg 2002, Joyce, Kaestner and Korenman 2000b, Kost, Landry and Darroch 1998, Marston and Cleland 2003, Mohllajee et al. 2007, Sable et al. 1997). However, this is not the case for cross-sectional studies of child mortality, which have shown associations in the *opposite* direction. For instance, Montgomery and colleagues' (1997) study using retrospective measures of mothers' pregnancy intentions and child mortality (cross-sectional DHS data from the Dominican Republic, Egypt, Kenya, Philippines, and Thailand) found that children from pregnancies labeled unintended were *more likely* to be alive at the time of the survey, although the correlations did not meet the threshold of significance in multivariate models. A recent study from India similarly reports results from their full, representative samples suggesting that unintended pregnancy is associated with child survival—*not* mortality (Singh et al. 2012); other evidence, however, suggests a null association (Wencak 2013).[5]

Combining longitudinal evidence that children born from unintended pregnancies have higher subsequent mortality with cross-sectional evidence of either an opposite or null relationship suggests that the cross-sectional nature of these data could be biasing the findings. Specifically, we hypothesize that a child having died before the survey may bias a mother's retrospective report of her pregnancy intentions. Though past research argues that

[5]Singh and colleagues 2012 report bivariate findings, based on their full sample, that Indian children from unintended pregnancies have lower mortality compared to their intended peers. Despite these descriptive findings from the full sample, both studies report mother-level fixed-effects models that show unintended pregnancy is linked to higher mortality. The fixed-effects models use a subsample of mothers with multiple children and variation in pregnancy intentionality to compare the outcomes of siblings while holding all time-invariant maternal factors constant. Meaning that, among the subsample of women with variation in pregnancy intentionality across children, children from unintended pregnancies have higher mortality compared to siblings from intended pregnancies. Family fixed-effects models typically reduce the size and strength of findings, given that unobserved factors are accounted for, standard errors are inflated, and unintendedness spills over to disadvantage all children (Barber and East 2011). However, the models also produce results in the opposite direction. The most plausible explanation for the reversal in direction is the non-representative nature of the fixed-effects sample and the fact that birth order—which is highly associated with unintended pregnancy and child death and varies between siblings—may be driving the finding. The authors of both studies call for additional research to better clarify the association between unintended pregnancy and child mortality.

mothers are prone to recall “lower quality”, unhealthy children resulted from unintended pregnancies (Joyce, Kaestner and Korenman 2002, McClelland 1983, Rosenzweig and Wolpin 1993); in the following section, we discuss why mothers may be reluctant to declare deceased children resulted from unintended pregnancies.

Child Death and Mothers’ Retrospective Reports of Unintended Pregnancy

There are two explanations for why a mother may be less likely to report a deceased child resulted from an unintended pregnancy compared to a living child. First, a child’s death may change the way a mother internally recalls the pregnancy, including whether she desired it at the time of conception. The death of a young child is a traumatizing experience with long-term psychological consequences (Figley, Bride and Mazza 1997). Some researchers argue that mothers in high-mortality contexts maintain emotional distance and ambivalence toward infants precisely because of this high risk of premature death (Scheper-Hughes 1985), but evidence from Africa confirms child death is an emotionally taxing experience for mothers (Castle 1994, Einarsdóttir 2005, Haws et al. 2010). For instance, anthropological work in Mali, West Africa, highlights women’s profound grief when talking about a deceased child, even decades after the death (Dettwyler 1991, Dettwyler 2013). The feelings of loss and sadness surrounding a child’s death may lead women to reflect on the child—and the pregnancy—in a more positive light.

Independent from a mother’s actual or enhanced memory of the deceased child and the related pregnancy, in face-to-face interviews mothers may be more comfortable reporting the pregnancy was intended. The social organization of childrearing puts extensive responsibility on mothers for their children’s health (Mackendrick 2014), and social narratives of “good mothering” (Hays 1996, Lupton 2012) blame mothers when children do not thrive. This is certainly the case when young children die: evidence from sub-Saharan Africa (Mali and Tanzania) shows that community members commonly agree that mothers bear some responsibility for their children’s death (Castle 1994, Haws et al. 2010). As a result, a mother whose child is no longer alive may be apprehensive to tell an interviewer the child resulted from a pregnancy that was poorly timed or unwanted.

Child’s Age at Death and Mothers’ Retrospective Reports of Unintended Pregnancy

The tendency for a mother to internally recall the pregnancy of a deceased child more favorably, or shift her external report of the pregnancy in an interview setting, may be heightened for children who died at older ages versus those who died early in infancy. The tendency for women to remember pregnancies in a more favorable light has been shown to increase with the child’s age (Koenig et al. 2006), which may reflect their growing attachment to the child over time. If mothers form a stronger bond with children as they age, though losing a child at any stage of reproduction, including pre-conception (Hughes, Turton and Evans 1999, Thapar and Thapar 1992), has negative psychological consequences, losing an older child may produce the greatest sense of loss and thus more powerfully color women’s recall of the pregnancy.

The death of an older child versus a very young infant may also more strongly discourage women from reporting in an interview setting that the child resulted from an unintended pregnancy. Whereas reproductive complications and genetic factors lead to most infant deaths, preventable causes underlie most deaths among children older than 1 year (Black, Morris and Bryce 2003). Thus, mothers whose children die after infancy may feel greater culpability for the death, because it is more likely to have stemmed from a preventable illness, such as a respiratory virus or malaria (Black, Morris and Bryce 2003). As a result, these mothers may feel the greatest guilt and be the least apt to outwardly label a deceased child as the result of an unintended pregnancy.

Current Study

In this study we explore whether a child's vital status is associated with a mother's retrospective report of the intentionality of the pregnancy from which the child resulted. The high rates of unintended pregnancy (Sedgh, Singh and Hussain 2014) and child mortality (Liu et al. 2015) in contemporary sub-Saharan Africa motivate our focus on the region. Recent estimates suggest that 8 out of every 100 pregnancies in sub-Saharan Africa are unintended.[6] The rate of unintended pregnancy has declined slightly in recent years, yet more than one-third (35 percent) of all pregnancies in the region are reportedly unintended (Sedgh, Singh and Hussain 2014). Moreover, one in every ten children in sub-Saharan Africa dies before their 5th birthday (Black et al. 2010).

If we find that mothers are less likely to label deceased children as unintended compared to living children, this may not mean that child deaths *cause* mothers to positively revise their pregnancy intentions—as we hypothesize—but instead could indicate that children resulting from unintended pregnancies actually have a lower risk of dying than children from intended pregnancies. If the latter explanation drives our findings, because both illness and stunting are positively correlated with child mortality, children from unintended pregnancies should also have better health. To test whether this is the case, we analyze parallel associations between more benign indicators of poor child health (recent illness and stunting) and mothers' retrospective reports of pregnancy intentions among children who are still alive. If results from these analyses confirm that mothers' reports of unintended pregnancy is linked with *poor* child health, but lower risk of dying, this will suggest that a child's death uniquely influences mothers' retrospective reports of pregnancy intentions.

Data and Sample

We use the most recent DHS data available from the 31 sub-Saharan African countries in which a survey was administered since 2000: Benin, Burkina Faso, Burundi, Cameroon, Chad, Congo (Brazzaville), Democratic Republic of the Congo, Ethiopia, Gabon, Ghana, Guinea, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome Principe, Sierra Leone, Senegal, Swaziland,

[6]The estimates calculated by Sedgh and colleagues (2014) pertain to all unintended pregnancies among women age 15 to 44 years, including pregnancies that ended in a live birth, abortion, or miscarriage. For the sub-Saharan Africa region, the study relies on Demographic and Health Survey data to calculate the percentage of unintended pregnancies, leaving open the possibility that these estimations are biased by the retrospective nature of women's reports.

Tanzania, Uganda, Zambia, and Zimbabwe. (See Appendix A for additional survey information.). The DHS program is a nationally representative survey fielded to a cross-sectional sample of participants every five years. The DHS uses a stratified random sampling approach, with clusters providing the primary sampling unit. Within each selected cluster, the DHS randomly samples families. Household heads complete a full roster of household members, from which the DHS identifies eligible women between the ages of 15 and 49.

The DHS asks women to retrospectively report their pregnancy intentions for each pregnancy that resulted in a live birth in the previous five years ($N = 288,788$). Because some women in the sample had more than one birth in the past five years, to ensure cases are independent, we restrict the sample to women's most recent birth ($N = 191,101$). Less than 1 percent of births are missing data; we exclude those cases and arrive at a final sample of 189,571 children.

For analyses of the association between child health (recent illness and stunting) and mothers' reports of pregnancy intentions, although only 1 percent of children are missing data on child illness, the anthropometric data we use to classify children as stunted are not available in many instances. Furthermore, because of the challenges associated with measuring small children, interviewers frequently flagged the anthropometric data as possibly inaccurate. Although results are consistent when using the full sample of living children, for parsimony, in the analyses of recent child illness and stunting we rely on the sample of 106,193 living children with valid anthropometric data.[7]

Measures

Unintended pregnancy

For each child born in the five years preceding the survey, DHS interviewers ask mothers: "At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?" This retrospective measure closely parallels survey items in the National Longitudinal Survey of Youth, the National Survey of Families and Households, and the National Survey of Family Growth, each of which are highly regarded data sources frequently used to study pregnancy intentions in the United States. We take the standard approach of categorizing a pregnancy as "unintended" if the mother reported it was wanted later or not at all, versus "intended" if the mother reported the pregnancy was wanted at that time. In supplemental analyses (see Appendix C), we used a three-categorical measurement approach (unwanted, mistimed, intended) to confirm that key associations between children's vital status and mothers' reports of pregnancy intentions are consistent when analyzing mistimed and unwanted pregnancies separately.

[7]To test the robustness of our results to sample restrictions, we conducted supplementary analyses on two additional samples. First, rather than focusing on the most recently born child in the past five years, we randomly selected one child from each mother. Second, because birth order is very closely correlated with pregnancy intentions, child survival, and child health, in a second set of parity-restricted estimates, we re-estimated the models focusing only on first-born children (born in the past five years). Each additional set of models produced estimates that are similar in size and statistical significance as those reported in the tables.

Child vital status

Women complete full birth history calendars, which include information on whether each child is still living at the time of the survey. We first use a binary indicator of whether the child is alive (0) versus deceased (1). In a second model set, we further categorize deceased children according to their having died in infancy (0 to 11 months) versus later childhood (12 to 59 months).

Child health: Recent illness and stunting

We leverage data on recent illness and nutritional status of living children to gain a better sense of whether the association between a mothers' retrospective report of the pregnancy and a child's death is unique from other measures of poor child health. In terms of illness, mothers' report whether all living children had (a) a cough, accompanied by short, rapid breathing, (b) a fever, or (c) diarrhea in the two weeks preceding the survey. These items are widely used in child health research in low-income countries (Stallings 2004). We differentiate between children who experienced no symptoms of illness (0) and those who experienced one or more (1).

In terms of nutritional status, we use available anthropometric data on living children's height and age to capture stunting. Using recommendations by the World Health Organization, the DHS records the number of standard deviations below (or above) the international reference population each child's height is for their age group. Severe stunting is most commonly defined as more than two or three standard deviations below the average (Pande 2003); however, because minor growth restriction is the first indication of a child's failure to thrive (Ruel, Rivera and Habicht 1995), especially among young children (De Onis and Blössner 2003, Rivera et al. 1998), and is a significant cause of child mortality (Black et al. 2013), we use a broader categorization: we code a child as displaying evidence of minor to severe stunting (1) if they fall more than one standard deviation below the international reference population. We code children who are less than one standard deviation below the reference population and those who are above it as (0).

Controls

We control for a number of child and maternal characteristics that may be associated with both children's health/survival and women's reports of pregnancy intentions. In terms of child factors, we account for gender (female = 1) and birth order. We also account for the number of years that have lapsed between the time of the child's birth and the date of the survey (i.e., age if the child is still alive), which is associated with children's wellbeing as well as women's likelihood to recall a pregnancy as intended.

Because the risk of unintended pregnancy differs according to mothers' marital status (Beguy, Mumah and Gottschalk 2014, Exavery et al. 2014), we control for mother's marital status at the time of the survey (never married [reference], married/cohabiting, widowed, divorced/separated, polygynously married). A mother's marital status at the time of the survey might differ from her status at the time she became pregnant; however, this is impossible for us to know because the DHS does not include data on the dates of each union formation/dissolution. To address the fact that we have imperfect information on women's

marital status, we also include an indicator for whether a mother has been married more than once. Furthermore, we account for additional maternal characteristics known to influence child health and pregnancy intentions, including age at the time of the child's birth (15 to 19, 20 to 34 [reference], or 35 years and older), highest year of school attained, and religion (Muslim = 1) (Exavery et al. 2014, Kamal and Islam 2011).

The likelihood of unintended pregnancy may vary by socioeconomic status, so we control for the DHS wealth index. The DHS aggregates information on households' assets (e.g., radio, television, refrigerator, bicycle, and car) and characteristics (e.g., availability of electricity, source of drinking water, type of toilet facility, and number of rooms) into a principal component factor analysis. The DHS then uses the factor scores to categorize households into five quintiles, which we use here: poorest [reference], poor, middle, rich, or richest (Bollen, Glanville and Stecklov 2007, Filmer and Pritchett 1998, Houweling, Kunst and Mackenbach 2003). In addition to the wealth index, we account for whether a household is headed by a female (1) versus a male (0), and whether it is in a rural (1) versus urban (0) community (Sedgh et al. 2006).

Analytic Strategy

Our analyses proceed in three steps. First, we provide descriptive statistics to characterize the children in our study. Second, we estimate logistic regression models to assess whether mothers are less likely to retrospectively label deceased children as the result of unintended pregnancies. Because a country's political, cultural, and economic climate is associated with both child mortality (Black et al. 2010, Liu et al. 2015) and unintended pregnancy (Singh, Sedgh and Hussain 2010), we take a country-level fixed-effects approach by including a set of dummy variables representing each of the 31 countries in our sample. This modeling strategy enables us to conservatively account for constant, unobserved country-level factors that may confound the associations of interest, and to produce estimates that compare the experiences of women within countries. In these analyses, we also disaggregate deceased children according to whether they died during infancy versus later childhood to confirm whether the findings vary by the child's age at death. Third, we estimate a parallel set of country-level fixed-effects logistic regression models to assess the likelihood that less healthy children are more likely to be retrospectively labeled as from an unintended pregnancy, focusing specifically on two indicators of poor child health: recent illness and stunting.

Results

Descriptive Findings

Table 1 gives an overview of the analytic samples. The first column characterizes the full sample of children, including those who were no longer alive at the time of the survey. Nearly one-third of the children's mothers' retrospectively reported that the child was from an unintended pregnancy, which is similar to the percentage among the subsample of living children, shown in the second column. The descriptive statistics further show that, among the full sample, 6 percent of these children were no longer alive at the time of the survey. Among the subsample of children who were still alive, more than one-third (37 percent) had

experienced a cough, diarrhea, or fever in the past two weeks. More than one-half of children (63 percent) showed evidence of stunting, that is, they were more than one standard deviation below appropriate height for their age. The percentage of children stunted in our sample is slightly higher than commonly published international rates (see, e.g., UNICEF 2009) because of our inclusion of children who are mildly stunted.

The results further show that in each sample, approximately one-half of children are female and are, on average, the third born. For the average child in our sample, the survey occurred slightly less than two years after their birth. At the time of the survey, most of the children's mothers were married (approximately 62 percent married monogamously and 26 percent polygynously), although a non-negligible percentage of mothers had never been married (approximately 6 percent) or were currently divorced/separated or widowed. Most children's mothers gave birth between ages 20 and 34 years, had just over three years of education, and lived in a rural area.

Figure 3 shows the bivariate association between child health and survival and mothers' retrospective reports of whether the child resulted from an unintended pregnancy. (See Appendix B for the full set of covariates disaggregated according to whether the child was from a pregnancy labeled intended versus unintended.) The results confirm that deceased children are more commonly reported to be from intended pregnancies compared to their living peers.[8] However, in line with existing theory and evidence, we find the opposite is true for more benign measures of child health: compared to their healthier peers, mothers more often report that recently ill or stunted children were from unintended pregnancies.

Child Death and Mothers' Retrospective Report of the Pregnancy

In Tables 2 and 3 we present results from fixed-effects logistic regression models to demonstrate the extent to which the above patterns are robust to inclusion of covariates. Each table reports odds ratios: a value below 1 implies a negative association, meaning the mother is less likely to have reported an unintended pregnancy; an odds ratio above 1 implies a positive association, meaning a higher likelihood of reporting the child resulted from an unintended pregnancy. Beginning with Table 2, Model 1 shows that mothers are significantly *less likely* to report deceased children were from an unintended pregnancy, net of children's gender and birth order: deceased children had 26 percent lower odds of being reported as resulting from an unintended pregnancy, compared to children who were still alive at the time of the survey ($p < .001$). Including the full set of controls in Model 2 slightly attenuates the size of the association; however, deceased children continue to have 23 percent lower odds of being reported as the result of an unintended pregnancy, compared to children who were alive at the time of the survey ($p < .001$). The results also confirm higher odds of resulting from an unintended pregnancy among children who were born to never-married mothers, born to teenagers, residing in female-headed households, and living in rural areas.

[8]Additional bivariate results (not shown here) confirm that whereas 24 percent of deceased children are reported as resulting from an unintended pregnancy, 28 percent of living children are reported as unintended.

The results in Table 3 confirm that the magnitude of the association between children's vital status and mothers' reported pregnancy intentions varies according to the age at which the child died. Compared to living children, a child who died in infancy has 17 percent lower odds of being reported as resulting from an unintended pregnancy, whereas a child who died at an older age has 37 percent lower odds of being reported as the result of an unintended pregnancy. Additional analyses confirms that, compared to children who died in infancy, children who died at an older age have 17 percent lower odds of being reported as the result of an unintended pregnancy. Thus, although all deceased children are less likely to be labeled as the result of an unintended pregnancy, this is especially true of children who died at older ages.

Poor Child Health and Mothers' Retrospective Report of the Pregnancy

To confirm whether this finding is particular to children's vital status, Table 4 provides model estimates of the association between more benign indicators of child health and mothers' retrospective reports of pregnancy intentions. Beginning with child illness, the results in Model 1 confirm that—in line with the large literature linking unintended pregnancy to worse child health—compared to children with no recent illness, mothers are more likely to report that children who have experienced a recent illness are from unintended pregnancies. In fact, recently ill children have 53 percent higher odds of their mother reporting they resulted from an unintended pregnancy ($p < .001$). The results in Model 2 confirm that the same is true for stunted children, who have 4 percent higher odds of being reported as the result of an unintended pregnancy compared to children who show no signs of growth faltering ($p < .01$). The fact that we find the anticipated associations between unintended pregnancy and two common indicators of poor child health—but the opposite when examining child death—suggests factors specific to a child's death lead women to shift their internal recall and/or external report of whether the associated pregnancy was intended.

Because unintended pregnancies include mistimed and unwanted pregnancies, in supplemental analyses (shown in Appendix C) we use a multinomial modeling approach to analyze the distinct associations between child health and mortality and each type of unintended pregnancy (intended, unwanted, and mistimed). The results confirm that, compared to their healthier peers, recently ill and stunted children are more likely to be reported as the result of a mistimed or unwanted pregnancy versus an intended pregnancy. We also include model estimates for deceased children (column 1 and 2), which confirm that deceased children are significantly less likely to be reported as resulting from a mistimed or unwanted pregnancy (than an intended one) compared to their living peers. The remarkable similarity in the size of the coefficients confirms that mothers of deceased children are just as likely to retrospectively report that the pregnancy was mistimed as they are unwanted (compared to intended).

Discussion

Much of the debate about how best to measure pregnancy intentions centers on the appropriateness of asking women to recall intentions regarding pregnancies that have

already concluded with the birth of a child. Fertility scholars have long expressed concern that women's retrospective reports of pregnancy intentions may be different from their actual feelings at the time of conception. Child health outcomes may prompt this revision; however, despite possible endogeneity, the vast majority of child health research on the consequences of resulting from an unintended pregnancy relies on cross-sectional data, leaving open the possibility of reverse causation.

This is especially problematic for child mortality research that relies on retrospective reports. Past research argues that mothers are prone to retrospectively recall "lower quality" —that is, unhealthy—children resulted from unintended pregnancies (Joyce, Kaestner and Korenman 2002, McClelland 1983, Rosenzweig and Wolpin 1993). Though we document such an association here, we also find that mothers are *less likely* to report deceased children —especially those who died in later childhood—resulted from unintended pregnancies.

Why are mothers less likely to report deceased children resulted from unintended pregnancies compared to their surviving peers? We argue that this is most likely because women either internally recall these pregnancies more positively and/or externally revise their reports of what were, in many cases, unintended pregnancies. The lack of data on women's reports of their pregnancy intentions at the time of conception, however, disallows us from confirming that this is true. That is, directly testing whether a child's death provokes a mother to *revise* her report of the pregnancy from unintended to intended requires longitudinal data with mothers' reports both at the time of the pregnancy and after the child's birth (and death).

Though we are not aware of such data from any of the sub-Saharan African countries we study here, such data are available on a group of women from Upper Egypt. In 1996/97, the Egypt In-depth Study of Reasons for Nonuse of Family Planning (EIS) sampled a group of reproductive age women from Upper Egypt who had participated in the 1995 Egyptian Demographic and Health Survey (EDHS) (see www.dhsprogram.com for more information). The 1995 EDHS asked 1,548 women who were pregnant at the time of the survey whether their current pregnancy was wanted at the time of conception, later, or not all. A total of 381 of these women participated in the EIS, at which time they reported (1) whether the resulting child still alive and again were asked (2) if the pregnancy from which the child resulted was wanted at the time of conception, later, or not at all.

A total of 17 percent (N = 66) of the 381 mothers initially reported their pregnancy as unintended (either mistimed or unwanted) when pregnant, but later reported the same pregnancy was intended after giving birth. Moreover, a total of six percent of the 381 pregnancies/children on which women report died between mothers' reports: 41 percent of deaths occurred in the first month of life and 59 percent after the first month but before the first birthday. Supplemental logistic regression models[9] (available upon request) confirm that a child having died within the first year of life is associated with a significant increase in

[9]The logistic regression models predicted whether the child was declared as unintended while in utero but retrospectively recalled as intended (1) versus any other configuration of reports (0) (reference group). In all models, we controlled for the relevant covariates available in the data: mothers' age, sibship size, household wealth, household size, and mothers' education. All models also accounted for the clustered design of the survey.

the odds that a mother initially reported the pregnancy was unintended but later revised her report to "intended" (odds ratio: 3.86 p<.05). These results powerfully bolster our argument that our main findings likely reflect the fact that a child's death provokes mothers to *revise* their report of pregnancy intentions so that the deceased child—regardless of whether they were intended—are labeled as such.

We offer two possible explanations for this revision process: women's memories of their pregnancies shift after the traumatic experience of a child's death, and/or women provide a positive report in the interview setting to avoid blame. Our results in Appendix C could be taken as some, albeit indirect, indication that the former process is at play. These results demonstrate that deceased children are *equally* less likely to be labeled as unwanted or mistimed versus intended. In an interview setting, reporting that a deceased child was from an unwanted pregnancy should be more stigmatizing than reporting the child was from a pregnancy that occurred too soon, so it is surprising that mothers are equally likely to report deceased children as mistimed or unwanted. This might indicate that the association is not necessarily a reflection of women's desire to avoid social stigma in the interview setting; rather, women are more likely to simply recall the pregnancy in a more positive light.

On the other hand, a study by Frenzen and Hogan (1982) in rural Thailand could be taken as indirect support that the latter explanation—women externally revise their reports in the interview setting—could be at play. Their study is unique for two reasons: (1) it relied on women's reports of their own *and* their husbands' views of whether the pregnancy was unintended, and (2) it is one of the only cross-sectional studies that shows children from unintended pregnancy have higher mortality. That is, the study finds that child death was more common among pregnancies retrospectively reported as unintended by the child's mother or father. This suggests that in interviews, women may more openly declare a deceased child as being from an unintended pregnancy when the lack of intention can also be attributed to her husband.

The data needed to separate these mechanisms make identifying which—if either—is operating a formidable challenge. Another possible way to gain some traction on the salience of each explanation with existing data is to investigate whether the findings vary across high- versus low-mortality contexts to approximate for differing levels of stigma attached to child death. Because we assume that women's emotional response to a child's death will be comparable across settings regardless of how pervasive child mortality is, if deceased children are especially unlikely to be reported as unintended in communities where child death is rare, but more commonly reported as unintended in communities where child death is more normative, this may reflect the fact that stigma and shame are leading women to externally report the deceased child as having been intended. Thus, future work that leverages heterogeneity in contexts may provide insight into the social conditions that make women especially apprehensive to report that a deceased child was from an unintended pregnancy, and thus may illuminate the mechanisms at play.

If our findings are, in fact, driven by women's apprehension to report deceased children resulted from unintended pregnancies, shifting the mode of data collection to computer-assisted personal interviewing could overcome this problem (Gregson et al. 2002, Gribble et

al. 1999, Gribble et al. 2000, Kurth et al. 2004). But even more minor changes to existing survey endeavors could help. Using the DHS as an example, immediately preceding questions on pregnancy intentions, interviewer protocol is to say, “Now I would like to ask you some questions about the health of all of your children…” (Macro International 2010). Referencing the child by name (including deceased children), one of the first topics discussed in the section on child “health” is whether the pregnancy was intended. Most mothers are generally apprehensive to label pregnancies as unintended in face-to-face interviews (Barrett and Wellings 2002), but mothers may be especially unlikely to do so after being prompted to think about the deceased child’s “health.” Separating discussion of child health outcomes from discussion of pregnancy intentions may reduce the risk that women feel uncomfortable reporting the associated pregnancy was unintended. Of course, future studies that track women’s pregnancy intentions over time and use complementary forms of data collection (e.g., face-to-face interviews and computer-assisted personal interviewing) are needed to confirm whether and how the interview setting may prompt women to revise their retrospective reports of intentions.

Of course, the interview setting may also discourage women from reporting deceased children all together. That is, there are probably a non-negligible number of instances in which women do not report the pregnancies or births of children who have died, meaning that the true level of child death in our data is likely underestimated (Helleringer et al. 2014). However, most research suggests that underreporting of child deaths is most common for children born more than 10 years prior to a survey (Curtis 1995); in this study, we focus only on children born within the past five years, and specifically women’s most recently born child.

If mothers whose deceased children were unintended are less likely to report the birth at all, compared to mothers whose deceased children were intended, this could also result in underreporting of unintended pregnancies. If such underreporting is occurring in our data, and if it is affecting levels of unintended pregnancies, it is unlikely to influence the associations documented here, because women will most likely omit all reference to the deceased child. That is, the underreporting of child death is correlated with women’s report of the pregnancy. Longitudinal studies that track women and children over time will also help to address the possible underreporting of child death.

The findings suggest that studies leveraging cross-sectional data on unintended pregnancies and child mortality are especially vulnerable to underestimating the true consequence of unintended pregnancy for child survival. Research on child health may also be vulnerable to issues of endogeneity. That is, if our cross-sectional findings reflect that mothers are more likely to label unhealthy children as resulting from unintended pregnancies, this will overestimate the true consequences of unintended pregnancy on child health. A study comparing the associations between retrospective versus prospective measures of intentions and child health in the United States suggests that timing of report does not overestimate the size of the relationship between particular child health outcomes (Joyce, Kaestner and Korenman 2002), but this issue should be more carefully explored in longitudinal studies of contexts where child health problems are frequent and often severe, such as contemporary sub-Saharan Africa. The results also point to the need for population estimates of pregnancy

intentions to use prospective measures—taken before a child is born—or innovative, non-pregnancy-specific measures (Casterline and El-Zeini 2007) to ensure that child outcomes are not systematically influencing published estimates of the level of unintended pregnancy.

Beyond its implications for studying pregnancy intentions, the study's results also inform the broader literature on child mortality, highlighting the need for data on not only its causes but also its consequences. Child mortality rates are declining across sub-Saharan Africa (Black, Morris and Bryce 2003), but child death remains a relatively common maternal experience, and this is unlikely to change in the coming decades. Only 6 percent of children in the sample had died, but focusing on women confirms that child death is a far more pervasive phenomenon: approximately 30 percent of mothers in our dataset had experienced a child death. Among women in sub-Saharan Africa who are nearing the end of their reproductive careers (ages 45 to 49), nearly 60 percent have lost a child. The vast majority of research on child death approaches it from a social problems perspective, focusing on identifying its causes rather than its consequences (Boyle et al. 2006, Cleland and Van Ginneken 1988, Desai and Alva 1998), but a child's death has great significance for a mother (Nobles, Frankenberg and Thomas 2015) and even her friends (Sandberg 2005, Sandberg 2006). Our study highlights the value of research that recasts the focus on child death as both a social problem and an intimate experience that shapes women's experiences, and one that also complicates efforts to understand women's reproductive intentions and desires.

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Appendices

Appendix A

List of Countries, Year of DHS Survey, and Corresponding Sample Size of Children Younger than Five Years Old

	Total # Children Younger than Five Years Old	Subsample of Youngest Child Per Mother	Final Sample for Child Mortality Analysis	Final Subsample for Child Health Analysis (only living children)
Benin (2011)	13,386	8,938	8,880	5,104
Burkina Faso (2010)	15,091	10,190	10,144	4,578
Burundi (2010)	7,736	4,815	4,797	2,192
Cameroon (2011)	11,799	7,598	7,519	3,373
Chad (2004)	5,666	3,472	3,441	2,834
Congo (Brazzaville) (2011)	9,296	6,339	6,310	3,100
Democratic Republic of the Congo (2007)	9,118	5,495	5,416	2,010
Ethiopia (2003)	11,852	7,808	7,751	6,584
Gabon (2012)	6,108	4,114	4,067	2,306
Ghana (2008)	3,026	2,151	2,132	1,740
Guinea (2012)	7,074	4,935	4,894	2,234
Kenya (2008)	6,138	4,090	4,067	3,454
Ivory Coast (2011)	7,875	5,406	5,349	2,277
Lesotho (2009)	4,037	3,154	3,130	1,274
Liberia (2006)	5,869	4,020	3,965	3,118

	Total # Children Younger than Five Years Old	Subsample of Youngest Child Per Mother	Final Sample for Child Mortality Analysis	Final Subsample for Child Health Analysis (only living children)
Madagascar (2008)	12,610	8,583	8,494	3,386
Malawi (2010)	20,015	13,534	13,451	3,103
Mali (2006)	14,266	8,870	8,808	7,106
Mozambique (2011)	11,133	7,534	7,500	6,351
Namibia (2006)	5,211	4,017	3,978	2,909
Niger (2012)	12,634	7,565	7,514	2,890
Nigeria (2008)	28,803	17,811	17,599	12,030
Rwanda (2010)	9,007	6,229	6,188	2,905
Sao Tome Principe (2008)	1,953	1,446	1,429	1,076
Senegal (2010)	12,390	8,080	8,039	2,399
Sierra Leone (2008)	5,700	3,988	3,918	1,463
Swaziland (2006)	2,840	2,136	2,120	1,560
Tanzania (2009)	8,102	5,353	5,318	4,667
Uganda (2011)	8,002	4,908	4,871	1,322
Zambia (2007)	6,470	4,154	4,139	3,373
Zimbabwe (2010)	5,581	4,368	4,343	3,475
Total	288,788	191,101	189,571	106,193

Source: Demographic and Health Survey

Appendix B

Descriptive Statistics for Children from 31 sub-Saharan African Countries, by Analytic Sample and Mothers' Retrospective Report of whether the Child Resulted from an Unintended vs. Intended Pregnancy

	Child Mortality Sample Mean/% (Standard Deviation)		Child Health Sample Mean/% (Standard Deviation)	
	Unintended	Intended	Unintended	Intended
Child Vital Status				
Deceased	8.77*	11.44		
Alive	91.23*	88.56		
Child Health				
Morbidity				
Recently ill			47.89*	37.49
No recent illness			52.11*	62.51
Stunting				
Stunted (1+ SD below WHO)			57.02*	55.02
Not stunted			42.98*	44.98
Child Characteristics				
Female	49.54*	49.20	49.70	49.37

	Child Mortality Sample Mean/% (Standard Deviation)		Child Health Sample Mean/% (Standard Deviation)	
	Unintended	**Intended**	**Unintended**	**Intended**
Birth Order	3.71 (2.47) *	3.48 (2.30)	3.82 (2.56) *	3.68 (2.37)
Time lag between birth and survey (in years)	1.78 (1.33) *	1.83 (1.33)	1.76 (1.30) *	1.81 (1.31)
Maternal and Household Characteristics				
Marital Status (at time of survey)				
Never Married	11.05 *	4.28	12.92 *	3.56
Monogamously Married/Cohabiting	59.11 *	62.83	60.15 *	66.31
Polygynously Married	21.25 *	27.63	19.39 *	25.3
Widowed	1.98 *	1.49	1.66 *	1.3
Divorced/Separated	6.61 *	3.77	5.88 *	3.53
Has married more than once	10.26 *	11.14	8.74 *	9.8
Age(at time of birth)				
15–19 years old	19.26 *	18.93	18.12 *	14.44
20–34 years old	67.85 *	70.13	65.77 *	71.18
35+ years old	12.89 *	10.94	16.11 *	14.38
Highest year of school attained	4.21(3.87) *	2.91 (3.89)	4.66 (4.02) *	3.29 (4.14)
Muslim	29.11 *	47.57	25.43 *	43.62
Household Wealth				
Poorest (reference group)	23.42 *	26.41	22.06 *	24.88
Poor	21.59 *	22.09	20.81 *	21.56
Average	20.11 *	19.68	20.14 *	19.59
Wealthy	19.27 *	17.42	20.07 *	18.15
Wealthiest	15.61 *	14.40	16.92 *	15.82
Female household head	22.32 *	15.49	23.67 *	16.61
Rural	72.81 *	75.29	69.79 *	73.1
N	189,571		106,193	

* $p < .05$ from tests of equal means (*t*-test) or proportions (chi-square) compared to intended pregnancies

Source: Demographic and Health Survey

Appendix C

Fixed-effects Multinomial Logistic Regression Model Results of the Relationship Between sub-Saharan African Children's Outcomes (Vital Status, Recent Illness, and Stunting) and Mothers' Retrospective Reports of whether the Child Resulted from a Mistimed or Unwanted Pregnancy versus an Intended Pregnancy

	Child Mortality Sample								Child Health Sample							
	Mistimed				Unwanted				Mistimed				Unwanted			
	Odds Ratio	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**
Child Vital Status																
Deceased																

	Child Mortality Sample								Child Health Sample							
	Mistimed				Unwanted				Mistimed				Unwanted			
	Odds Ratio	Coeff.	Sig.	S.E.	Odds Ratio	Coeff.	Sig.	S.E.	Odds Ratio	Coeff.	Sig.	S.E.	Odds Ratio	Coeff.	Sig.	S.E.
Died in infancy	0.82	−0.20	***	0.03	0.84	−0.17	***	0.04								
Died in toddlerhood	0.62	−0.48	***	0.07	0.65	−0.43		0.08								
Alive (reference group)	--				--											
Child Health																
Morbidity																
Recently ill									1.65	0.50	***	0.02	1.30	0.26	***	0.02
No recent illness (reference group)									--				--			
Stunting																
Stunted (1+ SD below WHO)									1.02	0.02		0.02	1.05	0.05	*	0.02
Not stunted (reference group)									--				--			
Child Characteristics																
Female	1.01	0.01		0.01	0.99	−0.01		0.02	1.01	0.01		0.02	1.01	0.01		0.02
Birth Order	1.10	0.10	***	0.00	1.33	0.29	***	0.00	1.09	0.09	***	0.00	1.33	0.29	***	0.01
Time lag between birth and survey (in years)	0.90	−0.11	***	0.00	0.98	−0.02	***	0.01	0.90	−0.10	***	0.01	0.98	−0.02	**	0.01
Maternal and Household Characteristics																
Marital Status (at time of survey)																
Never Married (reference group)	--				--				--				--			
Monogamously Married/Cohabiting	0.25	−1.38	***	0.02	0.15	−1.89	***	0.03	0.27	−1.32	***	0.03	0.14	−1.99	***	0.04
Polygynously Married	0.21	−1.55	***	0.06	0.28	−1.26	***	0.06	0.21	−1.54	***	0.08	0.26	−1.34	***	0.08
Widowed	0.43	−0.84	***	0.03	0.36	−1.02	***	0.04	0.45	−0.81	***	0.04	0.31	−1.18	***	0.06
Divorced/Separated	0.22	−1.50	***	0.03	0.13	−2.03	***	0.03	0.23	−1.45	***	0.04	0.12	−2.12	***	0.05
Has married more than once	1.02	0.02		0.02	1.09	0.09	**	0.03	1.00	0.00		0.03	0.99	−0.01		0.04
Age(at time of birth)																
15–19 years old	1.44	0.37	***	0.02	1.39	0.33	***	0.03	1.51	0.41	***	0.02	1.49	0.40	***	0.04
20–34 years old (reference group)	--				--				--				--			
35+ years old	0.52	−0.65	***	0.02	1.36	0.31	***	0.02	0.54	−0.61	***	0.03	1.49	0.40	***	0.03
Highest year of school attained	1.07	0.07	***	0.00	1.12	0.11	***	0.00	1.07	0.07	***	0.00	1.12	0.11	***	0.00
Muslim	0.99	−0.01	***	0.00	0.99	−0.01	***	0.00	1.00	0.00		0.00	0.99	−0.01	**	0.00
Household Wealth																
Poorest (reference group)	--				--				--				--			
Poor	1.05	0.05	**	0.02	1.13	0.12	***	0.03	1.04	0.04		0.03	1.14	0.13	***	0.04
Average	1.05	0.05	*	0.02	1.27	0.24	***	0.03	1.04	0.04		0.03	1.27	0.24	***	0.04
Wealthy	1.04	0.04	*	0.02	1.36	0.31	***	0.03	1.05	0.05		0.03	1.34	0.30	***	0.04
Wealthiest	0.90	−0.11	***	0.02	1.15	0.14	***	0.03	0.89	−0.11	**	0.03	1.11	0.10	*	0.05
Female household head	1.07	0.07	***	0.02	1.34	0.30	***	0.02	1.07	0.07	**	0.02	1.34	0.29	***	0.03
Rural	0.96	−0.05	***	0.02	1.23	0.21	***	0.02	0.94	−0.06	**	0.02	1.10	0.10	**	0.03
N	189,571								106,193							
Model Fit																
Log Likelihood	−135076.12									−74036.101						

Source: Demographic and Health Survey from 31 sub-Saharan African countries

*
p<.05;

**
p<.01;

***
p<.001

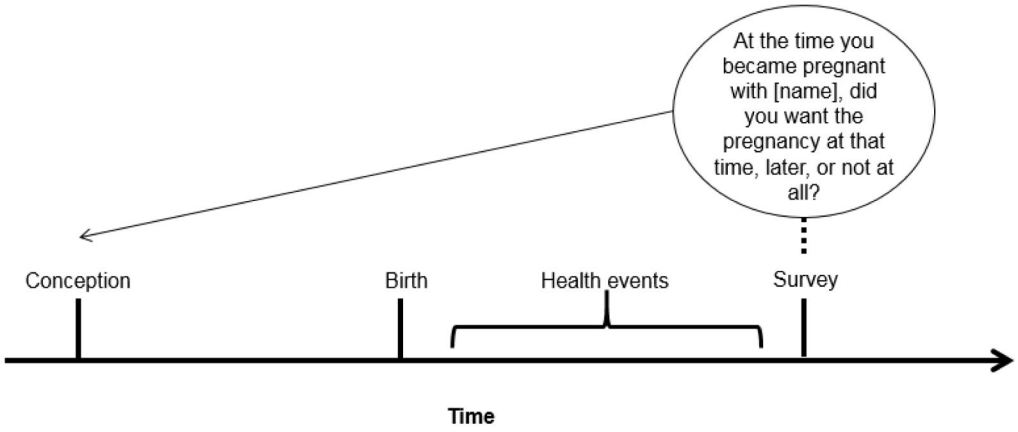

Figure 1.
Timeline of Key Reproductive Events and Women's Retrospective Reports of Pregnancy Intentions

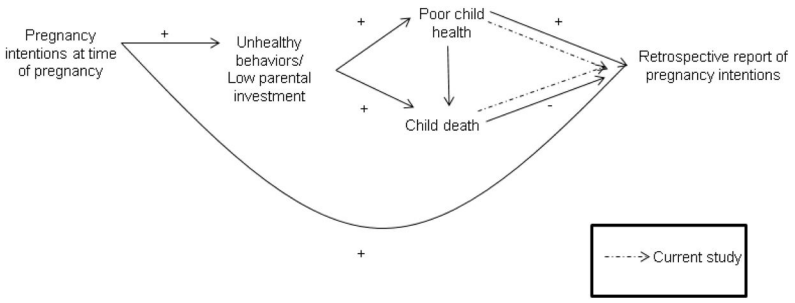

Figure 2.

Conceptual Diagram of the Relationships between Pregnancy Intentions and Child Health Outcomes

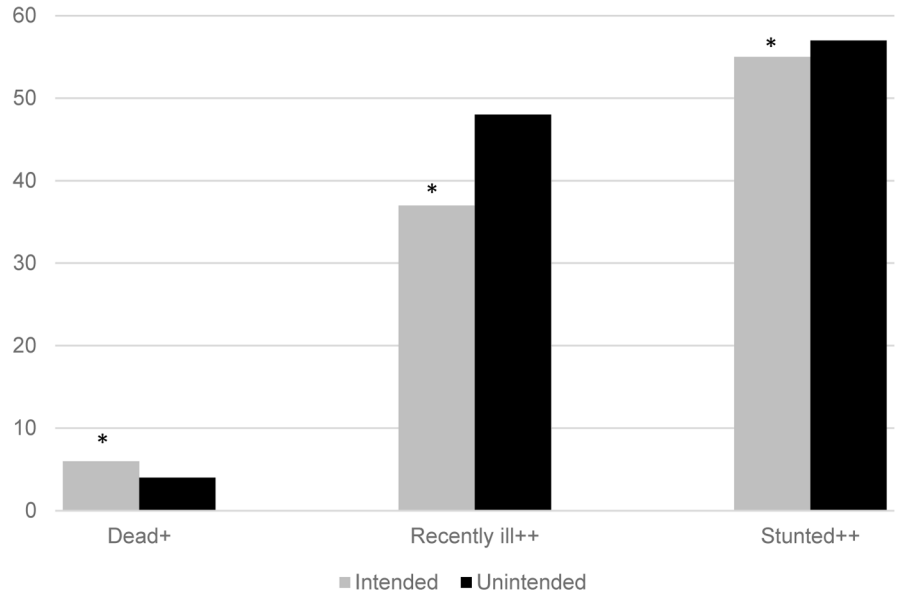

Figure 3.

Percentage of Deceased, Recently Ill, and Stunted sub-Saharan African Children by Mothers' Retrospective Report that the Child resulted from an Unintended vs. Intended Pregnancy

Source: Demographic and Health Survey from 31 sub-Saharan African countries

*p< 0.05 from tests of proportions (chi-square)

+*N*=189,571

++*N*=106,193

Table 1

Descriptive Statistics for Children from 31 sub-Saharan African Countries, by Analytic Sample

	Child Mortality Sample	Child Health Sample
	Mean/% (Standard Deviation)	Mean/% (Standard Deviation)
Mother retrospectively reported the child resulted from an unintended pregnancy	28.30	28.44
Child Vital Status		
Deceased	6.12	--
Alive (reference group)	93.88	--
Child Health		
Morbidity		
Recently ill	--	36.56
No recent illness (reference group)	--	63.44
Stunting		
Stunted (1+ SD below WHO)	--	56.34
Not stunted	--	43.66
Child Characteristics		
Female	49.30	49.47
Birth Order	3.55 (2.35)	3.73 (2.43)
Time lag between birth and survey (in years)	1.81 (1.33)	1.80 (1.32)
Maternal and Household Characteristics		
Marital Status (at time of survey)		
Never Married (reference group)	6.18	6.21
Monogamously Married/Cohabiting	61.72	6.21
Polygynously Married	25.91	23.69
Widowed	1.63	1.41
Divorced/Separated	4.55	4.17
Has married more than once	10.88	9.50
Age(at time of birth)		
15–19 years old	19.01	15.47
20–34 years old (reference group)	69.49	69.65
35+ years old	11.50	14.88
Highest year of school attained	3.27 (3.93)	3.68 (4.15)
Muslim	42.55	38.66
Household Wealth		
Poorest (reference group)	25.62	24.14
Poor	21.99	21.38
Average	19.82	19.78
Wealthy	17.91	18.66
Wealthiest	14.66	16.04
Female household head	17.39	18.57
Rural	74.65	72.23
N	189,571	106,193

Source: Demographic and Health Survey

Table 2

Fixed-Effects Logistic Regression Model Results of the Relationship Between sub-Saharan African Children's Vital Status at the Time of the DHS Survey and Mothers' Retrospective Report that the Child Resulted from an Unintended (vs. Intended) Pregnancy

	Model 1				Model 2			
	Odds Ratio	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**
Child Vital Status								
Deceased	0.74	−0.30	***	0.01	0.77	−0.26	***	0.01
Alive (reference group)	--				--			
Child Characteristics								
Female	1.01	0.01		0.01	1.01	0.01		0.01
Birth Order	1.04	0.04	***	0.00	1.14	0.13	***	0.00
Time lag between birth and survey (in years)	0.97	−0.03	***	0.00	0.92	−0.08	***	0.00
Maternal and Household Characteristics								
Marital Status (at time of survey)								
Never Married (reference group)					--			
Monogamously Married/Cohabiting					0.39	−0.95	***	0.01
Polygynously Married					0.46	−0.79	***	0.03
Widowed					0.67	−0.40	***	0.02
Divorced/Separated					0.33	−1.12	***	0.01
Has married more than once					1.08	0.08	***	0.01
Age(at time of birth)								
15–19 years old					1.21	0.19	***	0.01
20–34 years old (reference group)					--			
35+ years old					0.87	−0.14	***	0.01
Highest year of school attained					1.09	0.08	***	0.00
Muslim					0.99	−0.01		0.00
Household Wealth								
Poorest (reference group)					--			
Poor					1.08	0.07	***	0.01
Average					1.10	0.09	***	0.01
Wealthy					1.13	0.12	***	0.01

	Model 1				Model 2			
	Odds Ratio	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**
Wealthiest					0.96	−0.04	**	0.01
Female household head					1.20	0.18	***	0.01
Rural					1.07	0.06	***	0.01
Model Fit								
Log Likelihood	−286976.74				−271652.71			

Source: Demographic and Health Survey from 31 sub-Saharan African countries

* p<.05;

** p<.01;

*** p<.001

N=189,571

Table 3

Fixed-Effects Logistic Regression Model Results of the Relationship between sub-Saharan African Children's Age at Death and Mothers' Retrospective Report that the Child Resulted from an Unintended (vs. Intended) Pregnancy

	Odds Ratio	Coeff.	Sig.	S.E.
Child Vital Status				
Deceased				
Died in infancy (0–11 months)	0.83	−0.18	***	0.03
Died in toddlerhood (12–59 months)	0.63	−0.46	***	0.05
Alive (reference group)	--			
Child Characteristics				
Female	1.00	0.00		0.01
Birth Order	1.18	0.17	***	0.00
Time lag between birth and survey (in years)	0.92	−0.08	***	0.00
Maternal and Household Characteristics				
Marital Status (at time of survey)				
Never Married (reference group)	--			
Monogamously Married/Cohabiting	0.22	−1.53	***	0.02
Polygynously Married	0.19	−1.66	***	0.02
Widowed	0.27	−1.30	***	0.04
Divorced/Separated	0.41	−0.88	***	0.03
Has married more than once	1.04	0.04		0.02
Age(at time of birth)				
15–19 years old	1.51	0.41	***	0.02
20–34 years old (reference group)	--			
35+ years old	0.84	−0.18	***	0.02
Highest year of school attained	1.09	0.08	***	0.00
Muslim	0.99	−0.01	***	0.00
Household Wealth				
Poorest (reference group)	--			
Poor	1.08	0.07	***	0.02
Average	1.12	0.11	***	0.02
Wealthy	1.14	0.13	***	0.02
Wealthiest	0.97	−0.03		0.02
Female household head	1.16	0.15	***	0.01
Rural	1.04	0.04	*	0.01
Model Fit				
Log Likelihood	−104749.05			

Source: Demographic and Health Survey from 31 sub-Saharan African countries

*
p<.05;

**
p<.01;

*** p<.001

N=189,571

Table 4

Fixed-Effects Logistic Regression Model Results of the Relationship between Two Indicators of sub-Saharan African Children's Health (Illness and Stunting) at the Time of the DHS Survey and Mothers' Retrospective Report that the Child Resulted from an Unintended (vs. Intended) Pregnancy

	Model 1				Model 2			
	Odds Ratio	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**
Child Morbidity								
Recently ill	1.53	0.42	***	0.01				
No recent illness	--							
Child Nutritional Status								
Stunted (1+ SD below WHO)					1.04	0.04	**	0.01
Not stunted					--			
Child Characteristics								
Female	1.01	0.01		0.01	1.01	0.01		0.01
Birth Order	1.15	0.14	***	0.00	1.17	0.16	***	0.00
Time lag between birth and survey (in years)	0.93	−0.07	***	0.01	0.92	−0.08	***	0.01
Maternal and Household Characteristics								
Marital Status (at time of survey)								
Never Married (reference group)	--				--			
Monogamously Married/Cohabiting	0.29	−1.23	***	0.02	0.22	−1.50	***	0.03
Polygynously Married	0.49	−0.72	***	0.03	0.28	−1.27	***	0.06
Widowed	0.34	−1.08	***	0.05	0.41	−0.88	***	0.04
Divorced/Separated	0.27	−1.33	***	0.03	0.20	−1.63	***	0.03
Has married more than once	1.04	0.04	*	0.02	1.01	0.01		0.03
Age(at time of birth)								
15–19 years old	1.50	0.41	***	0.02	1.62	0.48	***	0.02
20–34 years old (reference group)	--				--			
35+ years old	0.85	−0.16	***	0.02	0.87	−0.14	***	0.02
Highest year of school attained	1.06	0.06	***	0.00	1.08	0.08	***	0.00
Muslim	0.56	−0.59	***	0.01	1.00	0.00	**	0.00
Household Wealth								
Poorest (reference group)	--				--			

	Model 1				Model 2			
	Odds Ratio	**Coeff.**	**Sig.**	**S.E.**	**Odds Ratio**	**Coeff.**	**Sig.**	**S.E.**
Poor	1.07	0.07	***	0.02	1.06	0.06	**	0.02
Average	1.15	0.14	***	0.02	1.10	0.10	***	0.02
Wealthy	1.19	0.17	***	0.02	1.13	0.12	***	0.02
Wealthiest	1.07	0.07	**	0.02	0.94	−0.06	*	0.03
Female household head	1.12	0.11	***	0.02	1.15	0.14	***	0.02
Rural	0.98	−0.02		0.02	0.98	−0.02		0.02
Model Fit								
Log Likelihood	−85005.43				−58236.10			

Source: Demographic and Health Survey from 31 sub-Saharan African countries

*
p<.05;

**
p<.01;

***
p<.001

N=106,193

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