Young Kenyan Women Are Less Likely to Finish School if They Have Dated or Had Sex

Young women in urban Kenya who begin dating or having sex have a reduced likelihood of completing secondary school, but the same is not true for young men, according to a recent study.[1] Females 14 or older who have had at least two romantic or sexual partners are more likely than peers who have never dated or had sex to stop attending secondary school (hazard ratios, 2.2–3.3). Sexually experienced young women are especially likely to drop out, and their likelihood of doing so increases sharply with their number of sex partners (hazard ratios, 1.7–7.7); these associations may be attributable mostly to pregnancy and marital desires, as the relationship between number of partners and schooling largely disappears when these factors are taken into account. Among young Kenyan men, however, there is no link between school attendance and number of romantic and sexual partners; instead, the strongest predictors of dropping out include impregnating a partner (3.2) and having an income (2.8).

Understanding the relationship between schooling and dating behaviors is particularly important in a setting such as Kenya, where social norms related to the timing of sexual debut and marriage are rapidly changing, school dropout rates are high and gender gaps in education are wide. To assess the timing and sequence of transitions related to education and sexual and reproductive health, the researchers interviewed young people aged 18–24 in Kisumu, Kenya, with the aid of life-history calendars on which they recorded the months in the past 10 years in which important life transitions had occurred. They collected data on each of respondents' romantic and sexual relationships, as well as on school enrollment and social and demographic characteristics. Because they expected the relationship between sexual activity and schooling to be bidirectional, the researchers used survival analyses to first examine whether sexual activity is associated with an increased risk of dropping out of secondary school and, second, to explore whether schooling is related to the timing of sexual debut.

The study, fielded in 2007, included data from 286 women and 322 men, who were selected using a random household sampling method. The samples were defined slightly differently for analyses of school dropout (which excluded participants who had left school before age 14) and those of sexual debut (which excluded participants who had had sex before age 10). In both samples, however, most participants were of Luo ethnicity (71% of women and 75–77% of men) and Catholic or Protestant faith (65–66% of women and 68–69% of men). Some 3–10% of women and 10–18% of men were earning an income when they either left school or became sexually active.

In the school dropout analysis, 46% of women and 34% of men had stopped attending school without graduating, and 3% of women and 11% of men were still enrolled. By the end of the observation period—that is, by the time they graduated from school, dropped out, or (if still enrolled) completed the survey—72% of women and 86% of men had had a romantic or sexual partner, and 49% of women and 69% of men had had sex. Some 33% of women and 38% of men reported having wanted to marry a partner during the observation period; 13% of women had been pregnant, and 6% of men were aware of having impregnated a partner.

The multivariate analysis showed that young women who had been in school at age 14 had an elevated risk of dropping out if they had had two (hazard ratio, 2.2) or three or more (3.3) romantic and sexual partners, compared with young women who had never dated or had sex. The association between school dropout and number of partners was even stronger when the analysis was restricted to sexual relationships: Compared with women who had never had sex, those who had had one, two or at least three sex partners were more likely to have left school early (1.7, 2.6 and 7.7, respectively). The link between number of sex partners and schooling may be driven largely by pregnancy and marital aspirations; when the investigators took these into account, sexually experienced women had an elevated likelihood of dropping out only if they had had three or more sex partners (3.8), and the risk of dropping out was substantially elevated among those who had ever been pregnant (3.8) or wanted to marry a partner (1.8).

In contrast, dropping out was generally unrelated to men's dating and sexual behaviors; the only exception was that men were more likely to have left school if they were aware of having impregnated a partner (3.2).

Several social and demographic measures were also associated with educational attainment. Women were at increased risk of dropping out if one or both of their parents had died (hazard ratios, 2.1–2.6, depending on the number and gender of deceased parents) or if they were Muslim (2.9). Members of both genders were less likely to have dropped out if their level of household assets fell into the middle or top, rather than bottom, tertile (0.2–0.4 for women and 0.2–0.3 for men), and more likely to have done so if they reported currently earning income (5.6 and 2.8, respectively).

In the sample used to analyze sexual debut, 81% of women and 86% of men were sexually experienced at the time of the study. Only 5–6% of participants had not been in school at age 10, but 29% of women and 18% of men had dropped out by the time of their sexual debut (or, if sexually inexperienced, by the time of the survey). An additional 24% of women and 35% of men were in school at the time of sexual debut (or at the time of the survey) but had fallen behind their grade.

In a multivariate analysis, young women were less likely to have begun having sex if they were in school, whether on track for their age (hazard ratio, 0.3) or not (0.4), than if they had dropped out; those who had graduated also had a reduced likelihood of having had sex (0.6). Again, no association between sexual behavior and education was seen among men. Women and men in the wealthiest tertile were less likely to have initiated sexual activity than were their counterparts

in the lowest asset category (0.6–0.7), while men whose mothers had died were more likely than those whose parents were both alive to have initiated sex (2.1).

The researchers note that their use of a life-history calendar may have minimized some forms of reporting bias, and that this approach provides more precise sequencing of events than do surveys that assess change on a yearly basis. This precision was important in their study because nearly one-third of participants who left school became sexually active within one year.

The investigators conclude that for young women, "transitions to becoming a mother and wife continue to conflict with the goal of finishing secondary school;" their findings suggest a pathway in which sexual activity leads to pregnancy, the development of marital aspirations and, eventually, school dropout. For men, however, the challenges to completing secondary school are different: Sexual activity has no apparent relationship with continuing school, but impregnating a partner or earning an income are major transitions that stand in the way of educational achievement. To increase school completion, the researchers recommend that policymakers "find ways of both encouraging the delay of some transitions to adulthood and at the same time accommodating students who have already become parents, spouses and wage earners."—*H. Ball*

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Cohort of Circumcised Men Shows No Evidence Of 'Risk Compensation'

During three years of follow-up, a cohort of HIV-negative Ugandan men who underwent circumcision did not appear to compensate for taking this preventive measure by adopting riskier sexual behaviors to a greater degree than uncircumcised men.[1] For example, condom use declined in both groups, but the decreases were comparable in magnitude. Similarly, the proportion of both circumcised and uncircumcised men who considered themselves likely to acquire HIV infection grew, but the changes were statistically indistinguishable. The study cohort consisted of men who had participated in a 2003–2006 randomized controlled circumcision trial, were recontacted during posttrial surveillance and were followed up for assessments of "risk compensation" in 2007–2011.

In the original trial, men aged 15–49 who tested negative for HIV, received posttest counseling and provided consent were randomly assigned either to undergo immediate circumcision or to have the procedure two years later. At six-, 12- and 24-month follow-up visits, men received a penile examination, an HIV test, individual-level health education and counseling, and free condoms (which were also available throughout the trial period at community-based locations). In addition, at each visit they completed interviews that covered their socioeconomic characteristics and their sexual and health behaviors. At the 24-month follow-up, uncircumcised men were offered free circumcision services and invited to enroll in the posttrial surveillance study; those opting to undergo the procedure were advised that it is not 100% effective in preventing HIV acquisition. Men who enrolled in the surveillance study returned for two follow-up interviews, roughly 18 months and three years later, and provided information on their sexual behavior during the past year. Researchers used chi-square tests to examine differences between men who chose circumcision and those who did not, and linear model analyses to examine behavior changes during the three years of follow-up.

The surveillance study cohort consisted of 1,297 men who underwent circumcision and 300 who did not. At baseline (before those who opted to be circumcised underwent the procedure), close to half of men in both groups were 25 or younger, and three-fourths had at most a primary school education; the majority were Protestant. Six in 10 men in each group were married; however, in the past year, nine in 10 had had sex, one-third had had two or more partners and one in seven had had multiple nonmarital partners. Alcohol use before sex was common (reported by 61–64% of sexually active men); levels of consistent condom use were low overall (13% in each group), but were higher with respect to nonmarital partners (44–50%). Eight in 10 sexually active men in each group reported no condom use at last sex with any partner; more than two in five of those with nonmarital partners reported nonuse with those partners. Twenty-eight percent of men who chose circumcision and 26% of others considered themselves likely to become infected with HIV. The groups differed by occupation; notably, 13% of men who chose circumcision were students, compared with 7% of others.

Between posttrial baseline and the final follow-up visit, reported levels of risk-related behaviors changed significantly in both groups. The proportion of participants who were sexually active in the past year (adjusted for loss to follow-up) increased by eight percentage points among circumcised men and by five percentage points among others. Circumcised men became increasingly likely to report just one partner (an increase of five percentage points); uncircumcised men, to report more than one (nine percentage points). Among sexually active men, reports of alcohol use before sex declined in both groups (by 6–8 percentage points), as did reports of consistent condom use with all partners (by 6–7 points) and with nonmarital partners (by 6–14 points among those who had had such partners). Reported nonuse of condoms at last sex became more common overall (increasing by nine percentage points among circumcised men and six points among others) and by men reporting a nonmarital partner (increasing by six and 19 points). The proportion of men considering themselves likely at risk of acquiring HIV infection rose substantially (by 25–28 percentage points) in both groups.

For the most part, the magnitude of changes did not differ significantly between circumcised and uncircumcised men. However, uncircumcised men became significantly more likely than circumcised men to report multiple sex partners in the previous year and nonuse of condoms at last sex with a nonmarital partner.

Results were similar in analyses stratified by age (16–20, 21–25, 26–30, 31–35 and 36–51). Again, almost no differences were evident between circumcised and uncircumcised men in change from baseline to final follow-up. The only exception was that in the youngest age-group, uncircumcised men registered a greater decline than circumcised men in the proportion reporting condom use at last sex with a nonmarital partner.

According to the researchers, their study suggests that male circumcision is not linked to risk compensation. They note that findings elsewhere in the literature have been mixed, but add that their study, unlike others, took place "in a posttrial setting, where the health benefits of circumcision were widely known and men voluntarily chose to accept or de-

cline free circumcision services." At the same time, they acknowledge a number of limitations of their study: Participants represented men who were motivated to enroll in a randomized controlled trial, and the education and counseling they received during its two years were more intensive than what would be provided in routine services; furthermore, most circumcised men in the posttrial cohort had had the procedure at least a year before the final assessment, but risk compensation may occur sooner after the operation. To further explore risk compensation among HIV-negative men who opt for circumcision, the researchers suggest that future studies "focus on the general population of men in programmatic settings and behavior changes within the short term after [the procedure]." —*D. Hollander*

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Women Who Suspect They Have HIV Want a Child Soon—or Not at All

The childbearing preferences of women who think they may be infected with HIV tend to diverge into two very different paths, according to findings from Mozambique.[1] On the one hand, compared with women who think it is impossible that they have HIV, those who say they may be infected are more likely to want to have children in the next two years than to do so later (odds ratio, 1.9). On the other hand, these women are also more likely to report that they would rather cease childbearing than have a child later (1.5). In other words, the women tend to want a child now—or never.

Because the growing availability of HIV testing and antiretroviral drugs has lengthened the time during which infected individuals are aware of their status—and the time during which they may have children—understanding the fertility intentions of the more than 22 million people living with HIV in Sub-Saharan Africa has become increasingly important. Studies of the relationship between HIV status and fertility preferences have yielded mixed results, although most have found that the desire to have children is lower among women who suspect or know they are infected, as these women fear transmitting the virus to their infant or dying before the child is grown.

The current study examined fertility intentions among women in Mozambique, where the average desired family size is large (4.3 children) and the prevalence of HIV is among the highest in the world (12–16% among adults aged 15–49, according to recent estimates); in the country's Gaza province, where the present study was conducted, desired fertility (5.4 children) and the prevalence of HIV (25–27%) are even higher. In 2009, researchers surveyed 1,638 randomly selected women from 56 villages in four rural districts of Gaza. The survey collected information on women's demographic, social and economic characteristics, as well as their fertility intentions and perceived HIV status. Fertility intentions were classified according to whether the woman wanted a child soon (within two years), later or never. To determine perceived HIV status, the investigators asked women to estimate the likelihood that they were already infected with the virus; response options were "very likely," "a little likely" and "almost impossible." Because the semantic difference between the first two options is small in Changana (the language in which most interviews were conducted), the researchers grouped the "very likely" and "a little likely" responses into a single category that represented women who thought they probably had HIV (the small number of women who spontaneously volunteered that they were infected were also included in this category); the investigators created another category for the substantial proportion of women who said they did not know their likely HIV status. In addition to reporting weighted descriptive statistics, the investigators performed multinomial logistic regression analyses to identify associations between perceived HIV status and fertility intentions. The analyses excluded respondents who were unmarried, childless or missing key survey data, yielding an analytic sample of 1,260 women.

Most women reported that they wanted another child soon (37%) or later (20%), though a substantial proportion (44%) did not want to continue childbearing. About a third of women (35%) thought it likely that they had HIV; 22% said it was impossible that they were infected, and 43% said they did not know their probable status. Women were more likely to report that they probably had HIV if they were aged 20 or younger than if they were 31 or older (47% vs. 32%). The only other measure associated with perceived likelihood of infection was whether the woman had been tested for HIV in the past year; 33% of women who had been tested, but only 20% of those who had not, said it was impossible that they had HIV.

In multinomial regression analyses, women who thought it was probable that they were infected were more likely than those who thought it was impossible that they were infected both to prefer to have another child soon rather than later (odds ratio, 1.9) and to prefer to stop childbearing rather than to have another child later (1.5); hence, they generally wanted to have a child either now or never. In contrast, the childbearing intentions of women who did not know their likelihood of having HIV did not differ from those of women who said it was impossible that they had the virus. None of the three groups differed from the others regarding the preference to stop childbearing rather than to have a child soon. Tests for interactions found no evidence that the relationship between perceived HIV status and childbearing intentions differed according to women's access to antiretroviral drugs or to medications that prevent mother-to-child transmission.

Not surprisingly, age and parity were also notable predictors of fertility intentions. Women preferred to stop childbearing, rather than to have a child later, if they were aged 31 or older rather than aged 26–30 (odds ratio, 2.0) or if they had a greater number of children (2.1 per child). They were more likely to want a child sooner rather than later if they were aged 31 or older rather than 26–30 (1.8), but less likely if they had a greater number of children (0.7 per child), had at least one child younger than 24 months (0.4) or had had an HIV test in the past year (0.5). Finally, women were more likely to want to stop childbearing, rather than to have a child soon, if they had any religious affiliation (1.9–2.4), had a greater number of living children (2.8 per child), had at least one child younger than 24 months (2.1) or had had an HIV test in the past year (2.3).

Although the findings are from a single country, the researchers note that because Mozambique shares many important characteristics with other eastern African countries, the results may be generalizable to other countries in the region with high HIV rates.

They add that study participants probably overestimated their HIV risk, and that as testing becomes more routine, women are likely to have a more accurate perception of their HIV status; if so, the proportion who intend to postpone childbearing, rather than take the now-or-never approach, will likely increase. However, carrying out intentions to delay childbearing is likely to be challenging for women in Mozambique, given their "limited access to effective long-acting contraceptives and safe abortion, [their] low autonomy, and the high social importance of childbearing" in the country.–*P. Doskoch*

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Unplanned Pregnancy Linked to Poor Child Health in India

Unintended pregnancies are associated with a variety of negative child and maternal outcomes, according to a large-scale analysis from India.[1] Although some of these associations were apparent in standard regression analyses, they were especially evident and particularly robust in analyses that took into account unmeasured familial factors; in the latter models, mistimed pregnancies, unwanted pregnancies or both were positively associated with deliveries without a skilled attendant (odds ratio, 1.3), incomplete early childhood immunization (1.4–2.2), child stuntedness (1.3), and neonatal, postneonatal and early childhood mortality (1.8–5.9).

Although numerous studies have examined relationships between pregnancy intendedness and subsequent maternal and child outcomes, results have been mixed, and no studies have focused on India, where more than five million unintended births occur each year (and where a third of the world's stunted children live). In the new study, researchers used data from the 2005–2006 Indian National Family Health Survey, which asked women about a range of social, demographic and health-related measures, including information about each pregnancy and birth the women had had in the past five years. The researchers examined four types of outcomes: whether a birth was supervised (i.e., took place in a medical institution or was attended by trained medical personnel); whether the child was stunted; whether the child had received the World Health Organization–recommended panel of vaccinations against six key infectious diseases (e.g., polio, tuberculosis); and whether the child had died. Child deaths were classified as neonatal if they had occurred within 28 days of birth, as postneonatal if they had occurred from day 29 to day 365, and as early childhood if they had occurred between the child's first and third birthdays; pregnancies were classified according to whether they were wanted, mistimed (wanted later) or unwanted (not wanted at all) at the time of conception.

The investigators used two approaches to identify predictors of these outcomes. First, they used basic logistic regression models that controlled for 12 variables, including household wealth, the child's age and birth order, and maternal age, education and autonomy; these analyses included the full sample of 51,555 births. Next, to account for unmeasured variables within families that might have affected the outcomes of interest, the investigators used family-fixed-effects regression models, which were restricted to births to women who had had two or more births that differed in the outcome of interest. For example, the analyses of neonatal mortality were restricted to births to women who had given birth during the past five years to both a child who had died within 28 days of birth and one who had survived. Although these analyses had greatly reduced sample sizes (465–7,619 births, depending on the outcome), their focus on sibling pairs helped control for the influence of differences in physical environment, childcare practices, and other household-specific factors that are not typically measured in large demographic surveys.

Overall, 80% of the births were the result of wanted pregnancies, 10% of mistimed pregnancies and 10% of unwanted pregnancies. Forty-one percent of the births were to mothers who had had no schooling, 71% to those aged 20–30 and 62% to those who lived in a rural area. Trained medical personnel had supervised fewer than half of the births (47%), and only 41% of children had received a full set of immunizations. About two in five children (42%) were stunted. Mortality rates were 43 per 1,000 births during the neonatal period, 22 per 1,000 in the postneonatal period and 10 per 1,000 during early childhood.

In standard regression analyses, mistimed pregnancies were less likely than wanted pregnancies to result in neonatal mortality (odds ratio, 0.8). Findings were very different, however, in the models that controlled for family fixed effects: Mistimed pregnancies were positively, rather than negatively, associated with neonatal mortality (1.8), and were also associated with elevated odds of unsupervised deliveries (1.3), incomplete immunization (1.4), and postneonatal mortality (2.6) in the fixed-effects analysis.

Unwanted pregnancies were also associated with undesirable maternal and child outcomes, and again the results differed by analysis type. In standard regression analyses, deliveries were more likely to be unsupervised if a pregnancy was unwanted rather than wanted (1.2), and children from unwanted pregnancies were more likely than those from wanted pregnancies to be stunted (1.1) and insufficiently immunized (1.3). Unwanted pregnancy was not associated with any type of child mortality. In the family-fixed-effects analyses, on the other hand, unwanted pregnancy was strongly associated with neonatal (2.2), postneonatal (3.6) and early childhood (5.9) mortality, as well as with stuntedness (1.3) and incomplete immunization (2.2); no association with unsupervised delivery was apparent, however.

The authors also performed analyses that used the same relatively small samples as the fixed-effects analyses but otherwise used standard regression methodologies. Although the associations identified in these analyses tended to mirror those found in the fixed-effects analyses, the odds ratios were uniformly (and often substantially) smaller, indicating that the differences between the results of fixed-effects regressions and those of the standard regressions were not due simply to differences in the samples, and that unmeasured familial factors influenced the outcomes observed in the study.

The researchers note that their study, like many, relied on retrospective assessments of pregnancy intentions that may not have accurately reflected women's desires at the time of conception; for example, women may have been reluctant to acknowledge that a cherished child was the result of an unwanted pregnancy. Another potential limitation of the study is that the women whose births were included in the fixed-effects analyses tended to be poorer and less educated than women in the full sample, which may limit the generalizability of the results. Nonetheless, the investi-

gators note that their findings are consistent with the hypothesis that unintended fertility takes "a significant toll on children and in some cases mothers," and that not only unwanted but also mistimed pregnancies may confer disadvantages. Given that "improving access to high-quality contraceptive services and fulfilling unmet need can reduce unintended pregnancies," the findings "underscore the importance of investments in family planning."—*P. Doskoch*

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Donor Aid For Child And Maternal Health Programs Fell in 2010

Donor aid from governments and global agencies to support maternal, newborn and child health increased substantially between 2003 and 2009, but, for the first time, dipped slightly in 2010, a recent analysis suggests.[1] Disbursements more than doubled, from $2.6 billion to $6.5 billion (in constant 2010 U.S. dollars), over the eight-year period, representing an average increase of 15% per year; in 2010, however, aid declined by 0.5%. Levels of aid to specific countries were more positively associated with levels of maternal and child mortality in 2010 than in 2005, suggesting that donor expenditures are being better allocated according to degree of need.

To assess trends in levels and targeting of donor aid, researchers used data from the Organisation for Economic Co-operation and Development's Creditor Reporting System to track disbursements from 2003 to 2010 from 43 donors, including 25 countries, 16 multilateral agencies (e.g., the World Health Organization) and two global health initiatives (e.g., the Global Fund). Donor aid was included in the analysis if its main purpose was to restore, improve and maintain maternal and newborn health (i.e., during pregnancy, childbirth and the first seven days postpartum) or child health (from the age of one week to age 5).

To assess the extent to which donor aid is targeted to health needs, the investigators examined the association between maternal and child mortality rates in 74 priority countries (i.e., those that account for the vast majority of maternal and child deaths) and levels of aid to those countries. This analysis was limited to a consistent set of 31 donors for whom disbursement data was regularly available from 2003 to 2010. All aid amounts were converted into 2010 U.S. dollars to allow for comparisons across time.

Between 2003 and 2010, annual donor assistance for maternal, newborn and child health increased from $2.6 billion to $6.5 billion, which translates to an average annual increase of 15%. In most years, expenditures increased substantially from the previous year. From 2005 through 2009, aid levels increased by at least 8%, and by as much as 37%, per year; rates of increase were generally similar for aid to the 74 priority countries. However, in 2010, donor assistance declined for the first time, albeit by a small degree (less than 1%), among all countries, and increased by only 3% among the priority countries. In comparison, global aid (excluding debt forgiveness) for all purposes increased by 5%, and that for all health programs by 8%, in 2010.

During 2003–2010, expenditures on child health accounted for about two-thirds of donor aid for maternal, newborn and child health programs, and about three-quarters of aid went to the priority countries. Not surprisingly, populous countries tended to receive the most aid; in 2010, for example, India, Pakistan, Tanzania, Nigeria and the Democratic Republic of the Congo received 27% of aid to priority countries for maternal, newborn and child health.

In 2010, the median aid to priority countries for child health programs was $17.90 per child, and the median aid for maternal and newborn health was $29.40 per live birth; these amounts are, respectively, 4.0 and 2.5 times those in 2003 in real terms. Regression models that compared levels of aid with mortality rates revealed that in both 2005 and 2010, disbursement of aid for child health programs was greater to countries with higher levels of child mortality. Disbursement for maternal and newborn health was unrelated to maternal mortality levels in 2005 but positively associated with maternal mortality in 2010, suggesting that targeting of funds improved. However, the regression coefficients were low in both analyses, suggesting room for improvement in responsiveness to need.

The investigators noted some limitations of their study. The analysis did not include support from nonprofit organizations, or aid from governments (including Brazil, China, India, Russia and South Africa) that do not report to the Creditor Reporting System (these countries provide about 10% of global aid). Moreover, the analysis provides only a portion of the financing picture, as domestic expenditures, which represent three-quarters of health spending in low-income countries, were not included in the analyses, because methods and tools for collecting and tracking such data are not yet fully developed.

Although the findings indicate that donor aid for maternal, newborn and child health more than doubled between 2003 and 2009, the results—together with recent reports from governments and global organizations—also suggest that aid decreased slightly in 2010, probably at least in part because of the present financial crisis, the researchers note. This reality underscores the need to improve the efficiency, effectiveness and targeting of aid, and to ensure donor accountability, the investigators emphasize. "Now, more than ever, independent monitoring and analysis of the quantity and quality of official development assistance is necessary to assess donor accountability and to understand and mitigate the potential effect of the present economic conditions on funding for maternal, newborn and child health."—*P. Doskoch*

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Traditional Birth Attendants Can Be Trained To Manage Hemorrhage

Training traditional birth attendants in the utilization of two "safe motherhood" tools—misoprostol and an absorbent delivery mat designed to measure postpartum blood loss—is feasible and may improve their ability to manage postpartum hemorrhage.[1] In an intervention study conducted in Bangladesh in 2009–2011, the vast majority of traditional birth attendants retained correct knowledge of the function, dosing and timing of administration of misoprostol and of the use of the delivery mat 18 months after training, and women whose deliveries were assisted by these providers were more likely than those using other or no providers to have used miso-

prostol and a delivery mat. Notably, although trained traditional birth attendants assisted with 43% of the births in the region during the study period, they took part in only 12 of the 113 deliveries (11%) that resulted in maternal death; none of these 12 deaths were attributable to postpartum hemorrhage.

Increasing women's access to skilled birth attendants is critical to achieving the goal of reducing maternal mortality worldwide. In low-resource settings such as Bangladesh, where fewer than 20% of births were attended by a skilled provider in the five years before 2007, teaching traditional birth attendants how to manage postpartum hemorrhage—the leading cause of maternal mortality—may help to achieve the goal. To assess the feasibility and acceptability of training traditional birth attendants in the use of the two safe motherhood technologies, researchers conducted an evaluation study in six rural districts of Bangladesh's Rangpur Division. In 2009, 696 traditional birth attendants completed a two-day, hands-on training session on the use of misoprostol to prevent and treat postpartum hemorrhage (including dosing, timing of administration and management of side effects) and the use of the delivery mat (which is designed to absorb 500 ml of blood, the threshold for defining postpartum hemorrhage). The attendents' background characteristics and preintervention knowledge were assessed at baseline; changes in knowledge were identified through follow-up assessments immediately after training and six and 18 months later. The birth attendants' delivery practices were evaluated through postpartum interviews with 3,016 randomly selected women who had given birth during the study period; all women in the region had had access to birthing kits containing misoprostol and a delivery mat, although women, their families and providers other than those who took part in the intervention had not received training on their use. The investigators used two-tailed z tests to assess changes in birth attendants' knowledge and to compare misoprostol and mat use between the trained birth attendants and the providers in the community (including birth attendants, nurses and doctors) who had not received the training.

On average, the traditional birth attendants were 47 years old, had had less than two years of formal schooling, had been attending births for almost 12 years and assisted with six deliveries per month. At baseline, only 12% of the birth attendants knew a method to prevent excessive bleeding during delivery. This figure increased to 94% right after training and remained high at the six-month (99%) and 18-month (97%) follow-ups. Measures of misoprostol and mat knowledge showed a similar pattern: Respondents had little baseline knowledge of either intervention, but rapidly acquired and retained the relevant information. For example, the proportion of participants who identified misoprostol as a way to prevent excessive bleeding increased from 3% before the intervention to 85% immediately after training and to 97% at 18 months; the proportion who knew that three tablets of misoprostol should be given to prevent hemorrhage rose from 1% before training to 100% immediately afterward and remained nearly universal (98%) at 18 months; the proportion who knew that misoprostol helps with placental delivery rose from 1% at baseline to 86% immediately after training and to 100% at the 18-month follow-up; and the proportion who knew that the degree of blood loss was best estimated by observing the delivery mat's absorption increased from fewer than 1% before training to 93% right after training and to 97% at 18 months.

Forty-three percent of mothers interviewed after delivery reported having been assisted by a traditional birth attendant trained to use misoprostol and the delivery mat. Use of the delivery mat was greater among trained traditional birth attendants (80%) than among untrained traditional birth attendants (68%), nurses (33%), doctors (8%) or women who had delivered alone or with the aid of relatives (63–66%); results were similar for misoprostol use. There were 113 maternal deaths in the region during the study period (out of 77,337 home deliveries); of these, 36 were the result of postpartum hemorrhage. However, only 12 (11%) of the deliveries that resulted in death had been assisted by traditional birth attendants who had received the training, and none of these deaths were caused by postpartum hemorrhage.

The researchers cite a number of study limitations: Patient and birth attendant records could not be matched; data on delivery practices were from women's reports, rather than from direct observation; the use of one intervention may have influenced the use of the other; and women and providers were not randomized. Despite these limitations, the researchers conclude that both safe motherhood interventions "were acceptable to traditional birth attendants and clients, and that traditional birth attendants used the interventions appropriately and effectively in the field." They suggest that their program be used "as a model to be adapted to other regions of the world where, unfortunately, high coverage of skilled birth attendants remains a distant goal."—*L. Melhado*

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