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HIV PREVENTION

Education Improves Breastfeeding Practices in Zambia

Last year, 800,000 children became infected with HIV, most of them during their mother's pregnancy, childbirth, or through breastfeeding. The Population Council's Horizons program has tested the introduction of infant feeding counseling to inform women about ways to reduce the risk of HIV transmission during breastfeeding and to support them in their infant feeding choices. The program is being tested at antenatal care clinics in Ndola, Zambia, a low-income setting where antiretroviral drugs are unavailable. The intervention is a collaboration with three nongovernmental organizations, Hope Humana, the LINKAGES project, and the Zambia Integrated Health Project, and two government agencies, the Zambian National Food and Nutrition Commission and the Ndola District Health Management Team.

The research shows that women receiving infant feeding counseling maintain healthier breastfeeding practices in the first six months of their infants' lives. But more work is needed to increase community use of voluntary HIV counseling and testing services and to promote behavior change for preventing HIV transmission and seeking care and support for HIV infection.

The Horizons program of operations research is implemented by the Population Council with the International Center for Research on Women, the International HIV/AIDS Alliance, the Program for Appropriate Technology in Health, Tulane University, Family Health International, and Johns Hopkins University.

Horizons is funded by the U.S. Agency for International Development; its findings allow the agency and its cooperating partners to allocate limited funds most effectively on the basis of empirical information.

Breastfeeding conundrum

In richer countries, mothers with HIV are advised to feed their babies exclusively with formula to avoid transmitting the infection. In poorer countries, however, this strategy can be problematic. In addition to the high cost of formula, a stigma is often attached to formula feeding babies because it suggests the mother may have HIV. Thus, formula feeding may lead to discrimination against the mother. Moreover, if clean water is unavailable, as it often is in poor countries, formula can do more harm than good by exposing babies to waterborne microorganisms that cause diarrhea and respiratory infections. These conditions, combined with malnutrition, are the leading causes of death among children under five years of age worldwide.

Feeding babies with a combination of formula or other feeds and breast milk can result in a higher rate of HIV transmission than breastfeeding alone. UNAIDS, UNICEF, and the World Health Organization advise that health-care managers conduct a thorough investigation into local infant feeding options and that health workers help individual HIV-positive mothers weigh the relative risks specific to each locality. Such an assessment conducted in Zambia's Ndola district found that for most mothers breastfeeding is the safest option, even when the mother knows she is HIV-positive.

Working with the study partners, six maternal and child health clinics in Ndola added services

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Hormone Choice May Reduce Risks of Menopause Therapy

The type of progestin hormone used in menopausal hormone therapy may have a large influence on the safety and potential side effects of that therapy, says Régine Sitruk-Ware, Population Council executive director for product research and development. "The results of a recent study have made many women and doctors skeptical of hormone therapy in general," says Sitruk-Ware. "But this study was based on a single hormone therapy. Other therapies, particularly ones using different progestin hormones, may have fewer side effects than the one studied." Sitruk-Ware recently outlined the properties of various progestins and progesterone, paying particular attention to potential risks and benefits. Some progestins are synthetic versions of the natural hormone progesterone, while others are derived from testosterone, a male hormone.

Progestogens in hormone therapy

Women usually use hormone therapy after menopause to alleviate symptoms, such as hot flashes, and health risks, such as heart disease, that result from a reduction of estrogen in their bodies. However, it is unsafe for women with intact uteruses to take estrogen alone. This causes cells in the endometrium to proliferate and greatly increases women's risk of endometrial cancer. Thus, for these women, it is necessary to use a therapy that combines estrogen with progesterone or a progestin. This combination reduces the risk of endometrial cancer from hormone therapy. Some people have argued, however, that progestins carry risks of their own that can offset the benefits of estrogen.

In July 2002, the U.S. National Institutes of Health announced the early end of a large study, part of the Women's Health Initiative, on the effects of estrogen plus progestin hormone therapy in healthy menopausal women. The study was halted because the overall health risks, particularly the risks of cardiovascular disease and invasive breast cancer, exceeded the benefits of the treatment. As a result of this study, the U.S. Food and Drug Administration requested that all manufacturers of menopausal hormone therapies change their labeling. These therapies now warn of an increased risk for heart disease, heart attack, stroke, and breast cancer. Sitruk-Ware contends, however, that "it would be inappropriate to extend the results of this trial to hormone therapy in general, because the effects of such therapies relate specifically to the type of hormones used in each drug."

The treatment employed in the Women's Health Initiative study, for example, used a progestin known as medroxyprogesterone acetate (MPA). Sitruk-Ware points out that, unlike natural progesterone, MPA may reverse some of the heart-protective effects of the estrogen in the drug and increase the risk of cardiovascular disease.

> *"Further studies are needed to compare the effects of a wide range of menopausal hormone therapy formulations."*

Unintended side effects

Human and animal studies have shown that different progestins have different influences on blood sugar and insulin levels, cholesterol levels, and the dilation of blood vessels. All of these factors play a role in cardiovascular disease. Some progestogens negatively affect these bodily functions and some have no effect.

The influence of hormones in the body, whether beneficial or detrimental, is determined by the hormones' interactions with cellular structures known as receptors. Hormones act in cells by binding to receptors. Progesterone and the progestins trigger specific responses within cells when they bind to progesterone receptors. Additionally, some progestins have the ability to bind to other receptors. This binding can trigger cellular responses that are different from the intended effects that result when hormones bind to the progesterone receptor. MPA's ability to offset some beneficial actions of estrogen on cholesterol and on blood vessels may be caused in part by the hormone's binding to structures known as androgen receptors. Natural progesterone and a few other progestins do not bind to androgen receptors and thus do not produce these side effects.

The chemical structure of the hormone determines what receptors it will bind to, says Sitruk-Ware. "Very small structural changes may induce considerable differences in the effects of progestogens," she explains.

Breast cancer

The effect of progesterone and the progestins on breast cancer is less clear. The use of estrogen in hormone therapy has been known for years to slightly increase the risk of breast cancer. Clinical trials, however, have produced conflicting results on whether progestins further increase this risk, or have no effect. The conclusions of the Women's Health Initiative study on breast cancer were generalized to all women using hormone replacement therapy, says Sitruk-Ware. The breast cancer risk found in the study appeared only in women who had previously used hormone therapy for several years and thus were at a higher risk before the study began.

"Further studies are needed to compare the effects of a wide range of estrogen/progestin hormone therapy formulations used in clinical practice around the world, so that beneficial and deleterious effects can be quantified," concludes Sitruk-Ware. ■

SOURCE

Sitruk-Ware, Régine. 2002. "Progestogens in hormonal replacement therapy: New molecules, risks, and benefits," *Menopause* 9(1): 6–15.

Focus on Newborn Survival Needed in Rural Pakistan

Child survival programs in the developing world have typically focused on the postneonatal period, the interval from one month of age to one year of age. This time of life has been targeted because cost-effective treatments and preventive medicine, such as childhood immunization and oral rehydration, exist for the most common ailments that occur then. These interventions, which gained momentum in the 1980s and continue today, have significantly reduced infant and child deaths in much of the developing world. As deaths in the postneonatal period become less common, however, an increasing proportion of infant deaths occur in the neonatal period, the first month of life. Limited data exist on the causes of neonatal death in developing countries. To address this dearth of information, Population Council program associate Fariyal F. Fikree used population-based surveys and in-depth interviews to gather data on infant mortality in rural Pakistan. She collaborated with Syed Iqbal Azam of Aga Khan University in Pakistan and Heinz W. Berendes of the National Institutes of Health.

Assessing infant mortality

The researchers conducted surveys and interviews in selected sites in Balochistan and North-West Frontier Province, including the Federally Administered Tribal Areas of that province. These surveys collected information on the level and clinical causes of maternal and infant mortality and their associated risk factors. The field work was conducted during 1990–91 in Balochistan, in 1991–93 in North-West Frontier Province, and in 1994 in the Federally Administered Tribal Areas. These largely rural regions were selected to reflect various levels of socioeconomic development, and accessibility and availability of health care personnel. In all of these areas, 90 percent of births occurred at home with the assistance of traditional birth attendants or family members.

The results showed that as infant mortality decreased, the proportion of neonatal deaths rose. In Balochistan the infant mortality rate was 129 per 1000 live births; 51 percent of these deaths happened in the neonatal period. In the Federally Administered Tribal Areas, where the infant mortality rate was 106 per 1000 live births, neonatal deaths accounted for 57 percent of these deaths. In North-West Frontier Province, where infant mortality was lowest, 70 per 1000 live births, the proportion of infant deaths that occurred in the neonatal period was highest, 67 percent.

Tetanus

"We found that tetanus was the predominant cause of neonatal deaths in North-West Frontier Province, where it caused 23 percent of deaths in the first month of life, and in the Federally Administered Tribal Areas, where it caused 36 percent of neonatal deaths," says Fikree. Tetanus was less common in Balochistan, causing only 5 percent of neonatal deaths. Diarrhea syndrome and acute respiratory infection were the main causes of neonatal death in Balochistan. These maladies became more common in North-West Frontier Province and the Federally Administered Tribal Areas during the postneonatal period.

These findings strongly demonstrate the need for a significant addition to child survival programs, say the researchers. Program managers should emphasize maternal and neonatal care, particularly strategies aimed at tetanus, while maintaining and strengthening strategies to reduce diarrhea and acute respiratory infections.

Neonatal tetanus in developing countries is largely attributable to three risk factors: lack of maternal immunization with tetanus toxoid, unhygienic delivery, and unhygienic umbilical cord care during the first week of life. Unhygienic cord care may include practices such as applying ghee (clarified butter) to the raw stump of the umbilical cord.

The maternal tetanus toxoid coverage reported in the Pakistan Demographic and Health Survey for 1990–91 was 23 percent. Tetanus toxoid immunization in the three rural areas surveyed is likely to be lower than the national average, say the researchers. "Increasing the number of women of childbearing age in these areas who receive tetanus toxoid immunization would greatly decrease the number of newborns who develop tetanus," says Fikree.

Although improving women's access to skilled birth attendants in these areas is important, adequate coverage in the near future is unlikely. Thus, increasing the maternal tetanus toxoid coverage, an easier task, is vital. ■

Top clinical causes of neonatal and postneonatal deaths in Balochistan and North-West Frontier Province, including Federally Administered Tribal Areas, Pakistan 1990–94

	Neonatal period		Postneonatal period	
Clinical cause	**No.**	**%**	**No.**	**%**
Diarrhea syndrome	33	5.1	213	43.3
Tetanus	119	18.3	14	2.8
Acute respiratory infection	39	6.0	93	18.9
Low birth weight	99	15.3	12	2.4

Source: *Bulletin of the World Health Organization* 2002, 80(4): 271–276, Table 1

SOURCE

Fikree, Fariyal F., Syed Iqbal Azam, Heinz W. Berendes. 2002. "Time to focus child survival programmes on the newborn: Assessment of levels and causes of infant mortality in rural Pakistan," *Bulletin of the World Health Organization* 80(4): 271–276.

OUTSIDE FUNDING

National Institute of Child Health and Human Development, National Institutes of Health, and UNICEF

Innovative Strategies Reduce Fertility in Ghana

In the early 1990s, surveys conducted in Ghana showed that people's desire for family planning was largely unfulfilled, despite two decades of policies aimed at making inexpensive family planning services available. Research also showed that mortality in remote rural areas was substantially higher than in urban communities. In response to this situation, the Ghanaian Ministry of Health designed the Community Health and Family Planning experiment at its Navrongo Health Research Centre (NHRC), a field station in rural northern Ghana. The Population Council provided research support and administered funding for this experiment. Many respected observers had stated that improving access to family planning services in rural sub-Saharan Africa would have little or no effect on fertility because kinship networks, family structures, and marriage customs favor large families. Recent results from the Navrongo experiment have provided an altered perspective on the issue.

Two strategies

The study team comprises investigators from the NHRC, Council staff members James F. Phillips and Elizabeth F. Jackson, and two Council fellows assigned to the NHRC, Cornelius Debpuur and Bawah Ayaga Agula. The experiment tests the relative effects of two strategies for delivering primary health care services to rural residents in the Kassena-Nankana District.

In one strategy, Ministry of Health nurses live and work in community-constructed health centers and provide health and family planning services door to door. In the other strategy—known as *zurugelu*, which means "togetherness" in the local language—door-to-door services are provided by local volunteers and supported by community leaders. These leaders also host community gatherings, known as *durbars*, that foster community dialogue about health and reproductive matters.

The study is being conducted in four geographic regions in the Kassena-Nankana District. People in Area 1 are exposed to the zurugelu strategy. Residents of Area 2 receive care from nurses. In Area 3, people benefit from contact with both the zurugelu and nurse outreach strategies. In these three experimental areas and in Area 4, the comparison area, residents have access to Ministry of Health fixed-location clinics.

The NHRC's central scientific resource is the Navrongo Demographic Surveillance System, which registers all demographic events—including births, deaths, migrations, marriages, and pregnancies—that occur in the lives of all 142,000 individuals residing in Kassena-Nankana District. The system also provides continuous estimates of fertility rates for approximately 43,000 women of reproductive age.

Change seen

"The initial results of the experiment suggest that in a traditional African society provision of primary health services in the local community and intensive social mobilization can make a difference in fertility and ideas and beliefs about reproduction," says Phillips.

Phillips and his colleagues examined the effect of the experiment on knowledge of contraceptives, desire to limit childbearing, reported contraceptive use, and fertility. Controlling for several potential biases, the researchers found that when nurse outreach and zurugelu were combined, married women's knowledge of contraceptives improved significantly more than it did in areas where either the zurugelu or the nurse outreach strategy was implemented separately.

Outreach by nurses, meanwhile, had the strongest influence on women's desire to limit childbearing. The researchers found that after one year of nurse outreach activities, women in that study group were 40 percent more likely to want to limit fertility than women in the comparison group. Women's fertility preferences in the zurugelu-only area were not significantly different from those of women in the comparison area. Women who experienced both nurse outreach and zurugelu were 20 percent more likely than women in the comparison group to want to limit their childbearing. "By emphasizing exchanges between nurses and individual women, the nurse outreach approach may introduce women to new ideas about childbearing that do not immediately arise from zurugelu activities in the community," says Jackson.

Does the desire to limit childbearing translate into contraceptive use? A statistical analysis showed that one year of exposure to nurse outreach and zurugelu implemented together increased reported modern contraceptive use among currently married women by 24 percent, a significant change. In the two areas where each of the strategies was implemented separately, no significant change was reported in contraceptive use. Evidence that fertility has fallen in all experimental areas, however, suggests that some women who use family planning may deny doing so. When the two interventions operated jointly, their fertility effect equaled the sum of the influence of each arm operating separately and resulted in a 15 percent reduction in fertility between 1994 and 1999.

Additive effect

"This demonstrates that zurugelu and nurse outreach have an additive effect on fertility reduction," says Phillips. The success of this experiment has led the government of Ghana to begin implementing the combined approach nationwide.

Other results from the Navrongo experiment, including effects on child survival, are expected in the future. ■

SOURCE

Debpuur, Cornelius, James F. Phillips, Elizabeth F. Jackson, Alex Nazzar, Pierre Ngom, and Fred N. Binka. 2002. "The impact of the Navrongo project on contraceptive knowledge and use, reproductive preferences, and fertility," *Studies in Family Planning* 33(2): 141–164.

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The Finnish International Development Agency, the Bill & Melinda Gates Foundation, the Andrew W. Mellon Foundation, the Rockefeller Foundation, and the United States Agency for International Development

The Future of Training Population Scientists

Since 1952, the Population Council has sustained a commitment to the goal of training population scientists from developing countries. While the demand for population scientists remains strong, the field has changed substantially in the last five decades. To examine the current situation with respect to recruitment, training, funding, and employment of population scientists, the Population Council convened an international panel of experts in September 2000. Jane Menken, of the University of Colorado, chaired the panel. The Population Council's representative was Cynthia B. Lloyd, director of social science research. Ann K. Blanc, of Blancroft Research International, served as consultant to the panel. Menken, Blanc, and Lloyd edited the panel's recent report of its findings.

A changing field

New global issues—the expansion of international migration, aging populations, persistent poverty, preservation of the environment, and the HIV/AIDS epidemic—have eclipsed the historical focus of population scientists on describing and explaining population growth and fertility decline. Demography, however, the methodological core of the field, continues to be the central shaper and producer of population knowledge. Because of its distinctive tools and perspective, the field of population studies is particularly well suited to exploring emerging issues and proposing effective solutions.

Despite the great need for population scientists, particularly ones from the developing world, a critical change in the population field that occurred in the mid-1990s has made it more difficult to train population scientists. At that time, the United Nations Population Fund and the United States Agency for International Development decreased or eliminated funding for Ph.D. and Master's-level training; new donors have not compensated for the withdrawal of these funds from the training arena. Opportunities for graduate training for promising developing-country scholars are thus now largely dependent on a diminishing number of private foundations and some national governments.

Key recommendations

"The most desirable situation we can cultivate is one in which population experts are trained primarily in high-quality institutions located in their own countries or regions," says Menken. "However, this scenario is not likely to be achieved in the near future." The panel's recommendations represent its assessment of the actions that are most likely to lead to a more desirable situation while taking account of existing needs and gaps. Crucial among these recommendations are:

There is a great need for population scientists, particularly ones from the developing world.

- Universities should provide a core set of Master's and Ph.D. courses in demography staffed by faculty with specialized training. All graduate students who want to become practitioners in the population field should master this core of knowledge.
- Universities should modify curricula to familiarize students of population with key concepts and methodologies from allied disciplines, especially economics, sociology, statistics, and public health.
- Universities should provide advanced training in formal demography for a small number of specialists.
- University administrators should think creatively about ways to make training programs more effective through international collaboration. Donors should make the funding of such programs a priority.
- Population organizations and universities should provide previously trained population scientists with opportunities for continuing education in the form of midcareer training. In addition to expanding knowledge, this type of training helps participants to build useful personal networks and institutional links.
- Population organizations should continue to encourage international participation in professional meetings and associations. It is crucial to maintain continuing contact between young and established researchers and to increase access to current research findings.
- Donors should fund the development of high-quality research centers responding to a locally determined research agenda. In general, support should be aimed at improving the sustainability of local institutions through the retention of local staff and the reversal of "brain drain" to developed countries. The most important elements of support are research grants, computer facilities, libraries, travel grants, and funding for transnational collaborations that include faculty exchanges.

"Advances in information technology have allowed research to be conducted at greater speed and lower cost," says Lloyd, "and the development of the internet has created new opportunities for collaboration and information sharing." But without funding for basic training of new population scientists from developing countries and continuing education for working scientists, the goal of significantly strengthening research capacity in the developing world will remain out of reach. ■

SOURCE

Menken, Jane, Ann K. Blanc, and Cynthia B. Lloyd (eds.). 2002. *Training and Support of Developing-Country Population Scientists: A Panel Report*. New York: Population Council.

OUTSIDE FUNDING

The Andrew W. Mellon Foundation

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aimed at preventing the transmission of HIV from mother to child. The services included counseling on infant feeding and voluntary HIV counseling and testing. The Sisters of the Sacred Heart, part of the Catholic Diocese in Ndola, participated by referring pregnant women to voluntary HIV counseling and testing services at the Ndola clinics. For social support the clinics referred HIV-positive mothers and their families to the Sisters of the Sacred Heart Home Based Care program and Hope Humana, a nongovernmental organization focused on HIV/AIDS.

Researchers assessed knowledge, attitudes, and practices regarding these added services and HIV in general through questionnaires administered to community members and mothers attending clinics. Baseline interviews among 1,430 people were conducted in 2000. An additional 1,300 respondents were interviewed in 2001, one year following the introduction of the intervention. Results from a third and final round of questionnaires are forthcoming.

In the study, all mothers were given information about feeding choices and offered the opportunity to learn their HIV status through confidential on-site counseling and testing services. A trained counselor guided each mother through the feeding choices and encouraged each to weigh the relative risks and benefits of infant-feeding options. Counselors advised HIV-negative women and women who did not know their HIV status to breastfeed their infants exclusively for the first six months, and to continue breastfeeding while introducing supplementary foods until the infant reached two years of age.

HIV-positive mothers were counseled about the option of exclusive formula feeding, including receiving instructions on how to boil water for this purpose, and warned of the negative effects of mixed feeding. The Ndola guidelines recommend that HIV-positive mothers stop breastfeeding at six months. At this age an infant can digest locally available alternative foods, such as maize porridge enriched with mashed fish, which would reduce the duration of potential virus exposure.

Findings

During the baseline interviews, researchers found that mothers were already well aware of the possibility of HIV transmission from mother to child. However, most believed nothing could be done to prevent transmission. Twelve months into the intervention, though, more mothers were able to name some of the steps that could be taken to reduce mother-to-child transmission, including, in addition to early weaning, the use of antiretroviral drugs during labor and delivery.

Exclusive formula feeding and avoidance of breastfeeding remained unpopular. According to the researchers, this may be due to the expense of infant formula supplies, the enormous effort involved in obtaining fuel to boil water for formula preparation, or the stigma of suspected HIV-positive status associated with artificial feeding.

At the clinics, researchers observed that logistical obstacles, such as a lack of test kits and other supplies, hampered achievement of some of the intervention's goals. Moreover, the survey revealed that voluntary HIV counseling and testing is widely perceived not as a source of important information about one's health and available services, but rather as a source of stress. There are few treatment options in Ndola for people who learn they are HIV-positive. Thus, "reported use of this service remained low, rising only to 14 percent from 5 percent among the clinic attendees in the first year of the study," says Naomi Rutenberg, Population Council senior program associate in the Horizons program. The researchers recommended that facilities further improve routine services while adding enhanced services to prevent the transmission of HIV from mother to child.

Communication between partners about HIV appears to be improving. Among female respondents from the clinic and the community who were tested for HIV infection, 93 percent told their spouse the result of the test, up from 63 percent at the start of the intervention.

Most importantly, following the intervention and enhanced counseling, the percentage of mothers in the community reporting they were exclusively breastfeeding rose from 56 percent to 76 percent, with fewer mothers reporting using the riskier practice of mixed feeding. "This trend suggests that with appropriate counseling, women will continue to adopt good breastfeeding practices, even as they become increasingly aware that HIV can be passed from a mother to her child through breast milk," says Sam Kalibala, a Population Council program associate based in Kenya.

A report on these findings can be downloaded in PDF form at http://www.popcouncil.org/pdfs/horizons/ndolamdtrm.pdf. ■

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