

Assisted Reproductive Technologies: Is the Price Too High?

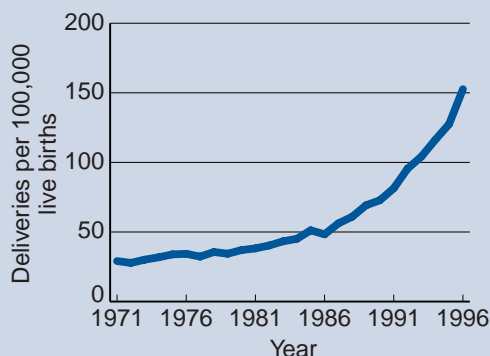
By ELIZABETH HERVEY STEPHEN

Octuplets born to couple in Houston. Woman, 63, bears child. Sheep cloned. Are assisted reproductive technologies, which make these feats possible, modern miracles, or is there a down side to their use that these headlines obscure?

Multiple Choices

Since July 1978, when Louise Brown was born in England as a result of an in vitro fertilization (IVF) procedure, many more options have become available to infertile couples. Assisted reproductive technologies (ARTs)—all medical interventions used in helping women get pregnant—include diagnostic testing, laparoscopic surgery, ovulation drugs, IVF, and more (see box, page 2).

Triplet (and Higher-Order) Birth Ratios, United States, 1971-1996, Total Population



Source: National Center for Health Statistics.

so infertility drugs have had a major effect on the number of multiple-order births in the United States and in most developed countries.

As seen in the figure above, the triplet birth ratio in the United States was 29.1 per 100,000 live births in 1971. This is calculated as the number of births

The 1995 National Survey of Family Growth reported that, of the 6.2 million women in the United States with impaired fecundity, 44 percent had sought treatment for infertility. About 40 percent of infertility problems are associated with females, 40 percent with males, and the remaining 20 percent are either unknown or associated with both partners.

As treatments for infertility, ARTs must be monitored carefully. Multiple-order births—triplets, quadruplets, quintuplets, and higher—are relatively uncommon in the general population,

Building Pyramids

PAGE 3

*News From the 1999
Population Association
of America Meeting*

PAGE 4

*Infant Mortality
Rates, Selected
Countries*

PAGE 6

Impasse at ICPD +5

PAGE 7

Reproductive Technologies

Continued from page 1

that are triplets, quadruplets, quintuplets, or higher-order multiple deliveries per 100,000 live births in that year. The ratio rose slightly until 1982, then began a dramatic increase, reaching 152.6 in 1996. The ratio rose 19 percent between 1995 and 1996.

The increase in multiple-order births is a result of two factors: the increase in the use of fertility drugs, and more women delaying childbearing until their late reproductive years, when it is more common to have a multiple-order birth. It has been estimated that about one-third of the increase in triplets between 1980 and 1994 was due to delayed childbearing and about two-thirds to fertility drugs.

Greater incidence of multiple births affects infant health indicators of long-term disability and death. The risks for preterm birth, low birth weight, developmental brain damage, and cerebral palsy rise sharply even for twins, and the risks are magnified for triplets and higher-order births. Furthermore, according to a July 1998 issue of *Science* magazine, children born as a result of the intracytoplasmic sperm injection technique (see box) are "twice as likely to have major congenital abnormalities as children conceived naturally."

Policy Implications

Assisted reproductive technologies have given couples more choices and more opportunities to have a biological child. There are, however, many concerns.

In the United States, reproductive endocrinologists typically transfer up to four embryos in an IVF procedure, depending on the age of the mother, the diagnosis of the infertility problem, and other factors. Couples are counseled before the procedure about the difficulties of bearing and raising triplets or quadruplets. If three or more embryos are detected in an early sonogram, the couple is given an option of selective reduction, whereby the number of fetuses is reduced. However, many couples who have been through costly years of infertility treatment with no previous success may opt to have triplets or quadruplets. To avoid triplet and multiple-order births, the United

Assisted Reproductive Technologies

- **Ovulation drugs** (clomiphene citrate, Pergonal, or Metrodin) enhance ovulation and may be used alone or in combination with one of the procedures listed below. The woman's cycle is closely monitored so that the insemination coincides with ovulation. Another shot may be administered to trigger ovulation.
- **Intrauterine insemination** involves inserting prepared sperm into the woman's uterus.
- **IVF** (in vitro fertilization) involves extracting a woman's eggs, fertilizing the eggs in the laboratory, and then transferring the resulting embryo(s) into the woman's uterus through the cervix. A variation on this method, popular with women ages 40 and older, is to use **donated eggs**. In this procedure, a female egg donor takes ovulation-enhancing drugs to produce a large number of follicles. The donor's eggs are retrieved and fertilized with the woman's partner's sperm or that of a donor. The embryos are transferred to the woman's uterus 48 hours after fertilization.
- **GIFT** (gamete intrafallopian transfer) is a process whereby a

fiberoptic instrument called a laparoscope is used to help place the unfertilized eggs and sperm into the woman's fallopian tubes.

- **ZIFT** (zygote intrafallopian transfer) involves fertilizing a woman's eggs in the laboratory and then using a laparoscope to help transfer the fertilized eggs (zygotes) into her fallopian tubes.
- **ICSI** (intracytoplasmic sperm injection) is used in dealing with male-related infertility. In ICSI, a single sperm is injected directly into an egg and then the embryo is transferred into the woman's uterus using the standard IVF procedure.
- **Sorting sperm** prior to insemination allows doctors to select only those that produce girls (who do not carry any of the more than 300 known x-linked chromosomal diseases).
- **Preimplantation genetic diagnosis** allows DNA-testing of embryonic cells. Using this technique, doctors of couples who fear passing on genetic diseases such as Tay-Sachs can confirm that only healthy embryos are transferred into the woman's uterus.

Kingdom has a law limiting to two the number of embryos transferred per IVF attempt.

The decision to transfer many embryos is also influenced by who pays for the procedure. Insurance coverage for infertility services tends to be limited or not available at all. Thus, couples who seek these treatments generally have to cover most or all of the costs, which can amount to \$10,000 for one cycle of IVF. Given the high cost of infertility treatment, it is likely that reproductive technologies will continue to be available to some couples but not others. According to the American Society for Reproductive Medicine, 14 states have some form of mandated infertility insurance coverage, and in those states fewer embryos are transferred per procedure.

Legal issues surrounding reproductive technologies are complex. Several researchers have called for a ban on the sale of human embryos, eggs, and sperm, as well as a ban on commercial surrogacy. Newspaper advertisements across the country seek egg donors. A recent ad in college newspapers caused an uproar because a couple was willing to pay \$50,000 to an egg donor with SAT scores over 1400 who was at least 5'10" tall.

Other legal issues have revolved around the difficulty in establishing parenthood when there may be as many as five people involved: a sperm donor, an egg donor, a gestational mother, and the contracting mother and father. In another recent case, a doctor mistakenly mixed embryos of two couples, resulting in one couple having twins: one white and one Afri-



Building Pyramids

By CHERYL STAUFFER

Population pyramids—used by demographers to represent the age and sex distribution of a particular population at a specific point in time—are easy to build.

The Shape Tells the Story

With relatively high fertility, most developing countries exhibit the classic “pyramid” shape (see graph of Guatemala’s age and sex distribution, above). Some developed countries, however, have begun to exhibit pillar-like shapes. And graphs for smaller areas, such as states and cities, may show further variation. For example, the above graph representing the age and sex structure of Sun City, Ariz., turns the traditional pyramid upside down. The graph tells the story of a haven for retirees.

Handy Tools

You can build these pyramids with a readily available, commonly used spreadsheet software program like Microsoft Excel.

A population pyramid is a specifically formatted comparative histogram. To create this histogram, you must first enter age and sex data into a spreadsheet, with the number of males and the number of females listed separately either by single years of age or by designated age cohorts. If you are interested in making any comparisons with other populations, you should calculate these data into percentages of the total population, for

example, females ages 0-4 as a percentage of the total population.

Here are the steps to take when you use Microsoft Excel:

1. After listing as negative numbers those data pertaining to males—Excel requires these negative numbers to graph the data appropriately—select the data for both males and females, as well as age category labels. Under **Insert**, select **Chart**; from the chart type, select the bar chart **Cluster Bar** from the chart wizard and follow the prompts for steps 2 to 4.
2. Click on the vertical axis and select **Format**. From the **Patterns** tab, set major and minor tick marks to “none” and set the tick mark labels option to “low.”
3. Click on either data series from the chart and select **Format**. From the **Options** tab, set the **Overlap** to 100 and the **Gap Width** to 0.

4. Click on the horizontal axis and select **Format**. From the **Numbers** tab, select the custom number format and enter in the following: **0;0**. Doing this will eliminate the negative signs.
5. Complete the chart by adding the appropriate labels to designate males and females, and by designating that the age and sex distribution is in percent, if appropriate. Apply any other formatting, such as altering the colors of the bars in the pyramid and removing the gridlines.

Data on the current age and sex distribution for the United States can be found on the Census Bureau’s Web site for states (<http://www.census.gov/population/www/estimates/statepop.html>) and counties (<http://www.census.gov/population/www/estimates/countypop.html>). Age and sex distribution data by race and Hispanic origin can also be downloaded. The Census Bureau’s International Data Base provides information on countries and displays pyramids for 1997, 2025, and 2050 (<http://www.census.gov/ipc/www/idbnew.html>).

Population pyramids can also be generated by using a software utility called “Population Pyramids 98” from HPN Technologies, Inc. (<http://www.visitus.com/popsite/software/pyramids/>). ■

For more information:

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Recently Posted

- Excerpts from “World Population Beyond Six Billion,” the latest *Population Bulletin*.
- **Contraceptive Safety: Rumors and Realities** in English, French, and Spanish.

Coming Soon

- Selected estimates, projections, and data from the *1999 World Population Data Sheet* (due in mid-May).

www.prb.org

This year's meeting of the Population Association of America, the professional association of U.S. population specialists, was held in New York City in late March and drew 1,674 participants. Here are highlights from just a few of the nearly 1,000 papers and posters presented.

Census 2000: Counting by Committee

Kenneth Prewitt, director of the U.S. Census Bureau, opened the session on Census 2000 by saying that the schedule to have the census ready by April 1, 2000, will be "very, very tight." And, he said, three measures now being considered by the U.S. House of Representatives' Committee on Government Reform would be "operationally disruptive at this phase." The measures to which he referred are sponsored by Republicans and include a mandated second mailing of the census form to every household, an increase in the number of languages into which the census form must be translated, and post-census review by local officials of the counts for their areas.

Tom Hofeller, a Republican staff member of the House Subcommittee on the Census, downplayed the role of partisanship in the conflict between Congress and the bureau and cast the problem this way: "The statistical community thinks they are high priests. ... I don't hear the statistical community owning up to the fact that there are some valid problems with sampling." He urged the bureau to invest more in explaining the issues, to recognize that there is no one right way to proceed, and to work to achieve "consensus in the polity." He also spoke of Congress' willingness to allocate additional funds to make changes in implementation.

Undeterred by talk of consensus and money—"I don't believe the blank check promises for a minute"—Prewitt responded: "At a certain

point, there has to be a time that's too late. If the measures ordering a second mailing and additional languages pass, we will model the damage that would cause, and we might recommend delaying." Finally, he asked, "Do they want us to do a census or participate in a Washington-based debate?"

TerriAnn Lowenthal, former staff director of the House subcommittee charged with census oversight and now a consultant to the Census 2000 Initiative, summed up the session: "The bureau is unprepared for its political role." She conceded a point made by Hofeller that conducting a sample survey has all the same problems of enumeration plus those of matching, and she urged demographers to reconsider the effectiveness of the current adjustment technique.

World Population Graying

Aging emerged as a theme of "World Population: Six Billion and Counting," which underscored the need for better communication between social scientists and policymakers. Several demographers and an investment banker participated in the panel discussion of world population issues.

Peter Peterson, chairman of the Blackstone Group and author of *The Gray Dawn: How the Coming Age Wave Will Transform America—And the World*, called for policy changes to prepare developed countries for the strains that aging populations will place on them. According to Peterson, developed countries' unfunded liabilities for pensions plus health care amount

to \$70 trillion, or three to five times current spending on defense and 9 percent to 16 percent of gross domestic product. To pay for these benefits, he said, payroll taxes would have to increase by between 25 percent and 40 percent, placing an unfair burden on workers.

He posed questions that he hopes policymakers and citizens will consider when they hear the numerical projections: whether developed countries with large populations of older people will become risk-averse and resistant to innovation, and whether political power will therefore shift to developing countries, which will have relatively more young people.

Joseph Chamie, director of the United Nations Population Division, remarked that the UN and other organizations have initiated discussions on aging, but that policymakers "don't believe our estimates."

Charlotte Hoehn, director of the Federal Institute for Population Research in Germany, likewise expressed frustration with her country's retirement policies. Contrary to the advice that she and others gave in the early 1990s—that, to keep its old age security system solvent, the government needed to reduce the level of pay-as-you-go pension benefits by half, or to double the amount of contributions—under Chancellor Gerhard Schroeder, measures have been proposed to accelerate retirement with full pension to make room for the young unemployed.

One factor behind policymakers' reluctance to act on population projections may be the disagreement among demographers about what to conclude from the numbers. John Bongaarts, vice president of the Population Council's Policy Research Division, said that the total fertility rate (TFR), which is used in the UN's most recent population estimates (see page 8), is lower than actual or cohort fertility because it is subject to a distortion called the "tempo effect." This effect refers to the rate of speed at which women bear their children, which in turn is influenced by the age

at which they begin bearing children. He stated that Italy's TFR of 1.2, when it is adjusted mathematically for the tempo effect, is closer to 1.7. He suggested, drawing on data showing a gap between current and expected or desired fertility, that the adjusted TFRs of many countries could rise to a level approaching replacement fertility (2.1). Tomas Frejka, a demographer recently retired from the UN Economic Commission for Europe, disagreed with Bongaarts' suggestion. Frejka reported that his own research on cohort fertility shows that below-replacement fertility appears to be taking hold in most European countries.

Childlessness Among Baby Boomers Plateaus

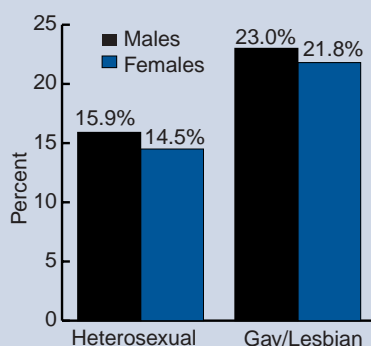
Childlessness among women ages 40 to 44 rose from 10 percent in 1980 to 19 percent in 1998, according to Amara Bachu, with the Fertility and Family Statistics Branch of the U.S. Census Bureau's Population Division. Women who had the highest levels of education, those engaged in managerial and professional occupations, and those with the highest family incomes experienced the highest levels of childlessness. Yet Bachu found that increases were small among successive baby boom cohorts, leading her to conclude that childlessness is tapering off for baby boomers.

Gays and Lesbians Well Educated, Understudied

Standard social science data sources now allow systematic study of the gay and lesbian population in the United States. These sources include the U.S. Census Bureau's Public Use Microdata Sample (5 percent sample), the National Health and Social Life Survey, and the General Social Survey.

Drawing from these data sets, Dan Black, professor of economics at the University of Kentucky, and Gary Gates, Seth Sanders, and Lowell Taylor—all from the Heinz School at Carnegie Mellon University—dis-

College-Educated Americans, by Sexual Orientation



Source: Dan Black, Gary Gates, Seth Sanders, and Lowell Taylor, Heinz School, Carnegie Mellon University, "Demographics of the Gay and Lesbian Population in the United States: Evidence from Available Systematic Data Sources," Paper, Population Association of America Meeting, March 1999.

cussed advantages and disadvantages of using each of these data sources. The team then presented statistics about the cities with the highest concentrations of gay men, and about the educational attainment (see figure above), earnings, and military service of gays and lesbians.

Deaths From AIDS in Africa Could Climb Higher Than Projected

Although the toll that AIDS is taking now on sub-Saharan Africa is visible, some widely circulated projections of the number of AIDS deaths that will occur there in the

coming years may be too low. Peter Johnson and Linda Hooper, demographers with the U.S. Census Bureau, painted three contrasting portraits of AIDS mortality in the region, based on data from the Global Burden of Disease (GBD) study conducted by the Harvard School of Public Health, the U.S. Census Bureau, and the UN Population Division.

The GBD predicts that AIDS deaths will peak at between 600,000 and 800,000 deaths around 2005, hold fairly steady until 2010, and decline to half a million by 2020. UN 1998 data lead to a higher projection, showing that deaths will peak at 2.3 million in about 2007 and drop to 2 million by 2012. Census Bureau data lead to the highest projected mortality, with deaths reaching 5 million in approximately 2015 and rising to 5.7 million by 2020. The differences, according to Johnson and Hooper, lie in prevalence data (the GBD uses 1992 data, whereas the other two sources use 1996 data), as well as in the models used by each source (see table below).

Warren Sanderson, chair of the Economics Department at the State University of New York at Stony Brook, who presented research on the effects of AIDS in Botswana and Namibia, found the Census Bureau projections in line with his observations. Yet, according to Anderson, UN estimates for population in the next century "could be true only if tremendous change were occurring now," which he said was not the case. ■

Basic Demographic Models Used in AIDS Projections

Data	Indicators, by source		
	GBD	Census Bureau	UN 1998
Fertility	Crude birth rate	Age-specific fertility rate	Age-specific fertility rate
Mortality	Deaths or mortality rate in broad age groups (by cause)	Mortality rates for each affected country	Survival ratios
Level of detail	Regional	Country-specific	Country-specific

Source: Linda M. Hooper and Peter D. Johnson, U.S. Census Bureau, "The Demographic Impact of AIDS Mortality on Sub-Saharan Africa: Contrasting Portraits," Paper, Population Association of America Meeting, March 1999.

POPULATION UPDATE

Estimated U.S. Population:

As of November 1, 1998	271,188,000
As of November 1, 1997	268,851,000

Latest data available from the U.S. Census Bureau, total monthly population estimates. Totals include armed forces overseas.

Estimated World Population:

As of April 1999	5,989,000,000
Annual growth	84,000,000

Extrapolated from the mid-1998 population on PRB's 1998 World Population Data Sheet.

Latest Provisional Statistics for the United States: November 1998

	12 months ending with November			
	Number		Rate	
	1998	1997	1998	1997
Live births	3,947,000	3,859,000	14.6	14.4
Fertility rate	—	—	66.0	64.7
Deaths	2,328,000	2,302,000	8.6	8.6
Infant deaths	27,500	27,100	7.0	7.0
Natural increase	1,619,000	1,557,000	6.0	5.8
Marriages	2,237,000	2,403,000	8.3	9.0
Divorces	974,000	1,153,000	3.6	4.3

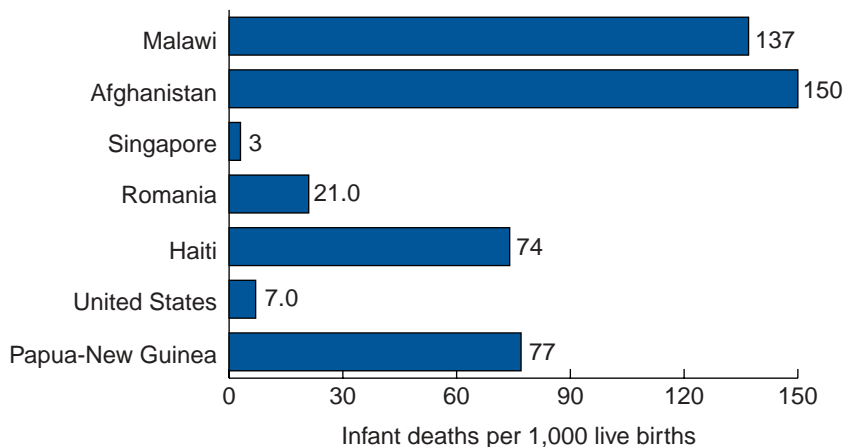
Note: Fertility rate is given per 1,000 women ages 15-44; infant deaths per 1,000 live births; other rates per 1,000 population.

Source: National Center for Health Statistics, *National Vital Statistics Reports*, vol. 47, no. 17 (1999).

SPEAKING GRAPHICALLY

Infant Mortality Rates, Selected Countries

(Most recent available data estimate)



Note: An infant is a child under age 1.

Source: Population Reference Bureau, 1999 World Population Data Sheet.

The infant mortality rate, like life expectancy, is a telling indicator of health conditions in any country. The graph above illustrates that large gaps remain worldwide. When comparing infant mortality, it is useful to keep in mind that infant mortality rates in developing countries are nearly always estimated or taken from periodic surveys. For most developed countries, vital statistics are considered completely registered and are reported annually. These "complete" rates are shown on the World Population Data Sheet to one decimal place for ease of reference.

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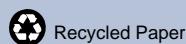
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* Educators, students, and seniors should send supporting documentation.



Impasse at ICPD +5

Nearly 180 countries met at the United Nations recently to decide what steps should be taken next to meet the 20-year goals of the Programme of Action agreed to at the 1994 International Conference on Population and Development (ICPD). The countries were guided in their efforts by recommendations drafted after The Hague Forum, which reviewed the progress that has been made on implementing the Programme of Action (see April 1999 *Population Today* for more on The Hague Forum).

The many government delegations met under the auspices of the UN Commission on Population and Development, acting as the preparatory committee (PrepCom) for an upcoming General Assembly Special

Session on implementation of the ICPD Programme of Action. Representatives of nongovernmental organizations and members of the media observed the meeting, which took place from March 24 to April 1, 1999.

Despite extending the PrepCom by an extra day and holding many late-night sessions, governments did not reach a consensus on the draft recommendations. One-third of the draft, which will eventually be given to the UN General Assembly for endorsement, remains to be negotiated.

Governments disagreed over proposals and wording related to sex education, reproductive rights of women and adolescents, family planning methods such as emergency contraception, and abortion. An Associated Press report indicated that other disagreements concerned whether to

urge countries to review punitive abortion laws and whether the World Health Organization should lead efforts to establish indicators for women's reproductive health. The greatest controversy arose over the participation of NGOs at the upcoming Special Session of the General Assembly. To finish negotiation on these issues, the UN plans another PrepCom meeting in May or June.

The Programme of Action adopted in Cairo in 1994 focuses on the reproductive health needs of individual men and women rather than on demographic targets. PrepCom, part of the five-year review process known as ICPD +5 or Cairo +5, will culminate in the Special Session of the General Assembly scheduled for June 30 to July 2, 1999.

Information on the next session of the PrepCom and the ICPD +5 review process is available online at: <http://www.unfpa.org/icpd/meetings.htm>. ■

Reproductive Technologies

Continued from page 2

can American. The latter child will be given to his biological parents, although both sets of parents have agreed that the "twins" will maintain contact with one another. Another recent birth has raised other ethical and legal concerns. A California woman gave birth in March using sperm retrieved from her husband 30 hours after his death. The sperm had been frozen for 15 months.

While cloning of humans is a long way off, we are already able to choose the sex of a child. And the world of assisted reproductive technologies is changing so rapidly that it is difficult to contemplate techniques that may be available in the near future. In his book *Remaking Eden: Cloning and Beyond in a Brave New World*, Princeton University Professor Lee Silver imagines a world where couples may be able to have "designer children" by choosing the genes for a child's hair color, height, and even for proclivity toward piano playing, and where same-sex couples will be able to have a child who is biologically related to both of them.

Who should regulate reproductive technologies: courts, physicians, Congress, or infertile patients? Should we be able to patent and market sperm and eggs? Should a woman be required to undergo selective reduction if she is found to be pregnant with quintuplets?

The debate over reproductive technologies will continue. While most people agree that it is in the best interest of society to allow couples reproductive freedom, we must reach a balance between the risks and benefits of ARTs—to couples and society at large. ■

For more information:

"1996 Assisted Reproductive Technology Success Rates: National Summary and Fertility Clinic Reports." *National Center for Chronic Disease Prevention and Health Promotion, Division of Reproductive Health, Centers for Disease Control and Prevention. January 1999. Available online: <http://www.cdc.gov/nccdphp/drh/art96/index.htm>.*

American Society for Reproductive Medicine, "Infertility Insurance Mandates Lower Multiple Births in IVF." Press Release. Oct. 6, 1998. Available online:

<http://www.asrm.org/current/press/lower.html>.

Anjani Chandra and Elizabeth Hervey Stephen, "Impaired Fecundity in the United States: 1982-1995," Family Planning Perspectives 30,1 (1998): 34-42.

Institute for Science, Law, and Technology (ISLAT) Working Group, Illinois Institute of Technology, "ART into Science: Regulation of Fertility Techniques," Science 281 (July 31, 1998): 651-52.

Joyce A. Martin, Marian F. MacDorman, and T.J. Mathews, "Triplet Births: Trends and Outcomes, 1971-94," Vital and Health Statistics 21, 55 (1997).

Lee Silver, Remaking Eden: Cloning and Beyond in a Brave New World (New York: Avon, 1997).

Stephanie Ventura, Joyce Martin, Sally Curtin, and T.J. Mathews, "Report of Final Natality Statistics, 1996," Monthly Vital Statistics Report 46, 11, supplement (1998).

Elizabeth Hervey Stephen is an associate professor and chair of the demography department at Georgetown University.

NEWS AND RESOURCES

PRB board member named 1998 IUSSP laureate

Samuel H. Preston, a leading demographer for the past 25 years, has been named the 1998 laureate by the International Union for the Scientific Study of Population.

Preston is the Frederick J. Warren Professor of Demography at the University of Pennsylvania and dean of the School of Arts and Sciences. He previously served in the department of demography at the University of California, Berkeley; in the department of sociology at the University of Washington; and with the United Nations Population Division. Preston has served on the Population Reference Bureau's Board of Trustees since 1994.

Preston is known for his pioneering work on the adjustment of census data for age misreporting, most recently among African Americans.

PRB Reports on America

The second issue of *PRB Reports on America*, "America on the Edge of Two Centuries," will be published in mid-May. In it, Daphne

Spain, professor of urban and environmental planning at the University of Virginia, explores the influence of immigration and race relations on American institutions. She places contemporary concerns about assimilation and pluralism in historical perspective by reviewing similarities and differences between the 1890s and the 1990s.

PRB Reports on America is a quarterly publication that addresses significant national issues. The first issue, "The 2000 Census Challenge," by Barry Edmonston, was published in February.

PRB members receive *PRB Reports on America* as part of their annual membership. Additional copies are \$5 each (discounts available for bulk purchases). Nonmembers can receive one complimentary copy by adding their names to a mailing list found on PRB's Web site: <http://www.prb.org>.

UN says population will increase 3 billion by 2050

World population will increase 3 billion by 2050, according to recent estimates by the United Nations Population Division.

Upcoming PRB Policy Seminar

PRB hosts monthly noontime seminars on demographic trends and policy issues at our Washington, D.C., office.

The final policy seminar for the 1998-1999 academic year has been set for Wednesday, May 19. It will be a panel discussion of recent developments in the ICPD +5 process, a review of progress made since 1994 in implementing the Programme of Action that emerged from the International Conference on Population and Development.

PRB policy seminars are free and open to the public. To receive regular notices of upcoming seminars, contact PRB at 202/483-1100; fax: 202/328-3937; e-mail: popref@prb.org. Or visit PRB's Web site at <http://www.prb.org>.

Population in developed regions is expected to remain stable at 1.2 billion, while the population in developing countries is projected to increase from 4.8 billion to 7.8 billion.

The biggest growth will be seen in India, where the population is projected to grow by 50 percent, over the next 50 years, to 1.5 billion, making it the most populous country in the world, according to Joseph Chamie, director of the United Nations Population Division.

Five countries—India, China, Pakistan, Indonesia, and Nigeria—make up more than 50 percent of the annual growth in world population.

For more information, access the UN Web site at <http://www.un.org/News/Press/docs/1999/19990322.pop711.html>.

New Books

Island Paradox: Puerto Rico in the 1990s. Francisco L. Rivera-Batiz and Carlos E. Santiago. New York: Russell Sage Foundation. 256 pages. 1998. \$16.95.

The Ostrich Factor: Our Population Myopia. Garrett Hardin. New York: Oxford University Press. 176 pages. 1999. \$22.

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