

# PERSPECTIVE

## Advanced Maternal Age — How Old Is Too Old?

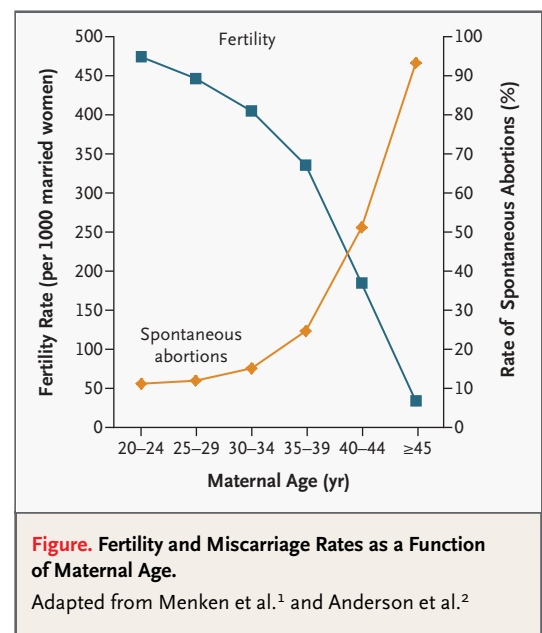
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The past decade has seen a remarkable shift in the demographics of childbearing in the United States. The number of first births per 1000 women 35 to 39 years of age increased by 36 percent between 1991 and 2001, and the rate among women 40 to 44 years of age leaped by a remarkable 70 percent. In 2002, 263 births were reported in women between 50 and 54 years of age. Most media attention paid to older moms has been favorable, inspiring a female business-school student to declare on a nationally televised segment of CBS's *60 Minutes* (entitled "The Biological Clock"), "I plan to be super fit, super in shape when I'm 40, 50. And if I'm physically able to do it, then I will have a child at 55."

How realistic is it for a young woman today to expect to delay her childbearing into the fifth or sixth decade of her life while she pursues her career? The effect of maternal age on the outcome of pregnancy may be best assessed by examining five specific factors that can negatively affect the desired outcome of a pregnancy — namely, a healthy mother and a healthy baby: declining fertility, miscarriage, chromosomal abnormalities, hypertensive complications, and stillbirth. Maternal death, the risk of which also increases with age, is fortunately so rare that it does not factor into this discussion. When examined according to the decade of life, the data on these reproductive outcomes speak for themselves.

Fertility is the rate of childbearing in a population. Fertility rates in populations that do not practice contraception best approximate the ability of women to conceive. The Figure shows the effect of maternal age on the average rate of pregnancy, calculated on the basis of 10 different populations living between the 17th and the 20th centuries that did not use contraceptives. Fertility remains relatively stable through 30 years of age, at more than 400 pregnancies per 1000 exposed women per year, and then begins to decrease substantially. By 45 years of age, the fertility rate is only 100 pregnancies per 1000 exposed women.

Miscarriage is defined as spontaneous pregnancy loss before the 20th week of gestation. Karyotyping of the products of conception after miscarriage indicates that about two thirds are chromosomally abnormal. The Figure shows the relationship between maternal age and miscarriage rates. At 20 years of age, the rate is about 10 percent. It increases to a high of more than 90 percent among women 45 years of age or older. This high miscarriage rate contributes significantly to decreasing fertility among older women. The effect of advancing maternal age on the risk of chromosomal abnormalities is well known. The Table shows the risks of Down's syndrome and any chromosomal abnormality according to five-year increments of maternal age.<sup>3</sup> Advanced paternal age, which is frequently associated with advanced maternal age, increases the risk of autosomal dominant diseases, such as achondroplasia and Marfan's syndrome, that appear to result from new genetic mutations. Deterioration in the quality of the ova with advancing ma-



**Table. Risk of Down's Syndrome and Chromosomal Abnormalities at Live Birth, According to Maternal Age.\***

Maternal Age at Delivery (yr)	Risk of Down's Syndrome	Risk of Any Chromosomal Abnormality
20	1/1667	1/526
25	1/1200	1/476
30	1/952	1/385
35	1/378	1/192
40	1/106	1/66
45	1/30	1/21

\* Modified from Hook et al.<sup>3</sup>

ternal age is thought to be responsible for both the decline in fertility and the increasing risk of chromosomal abnormalities; recent experience with in vitro fertilization using donor eggs from younger women supports this hypothesis.

Hypertensive complications of pregnancy are classified in two categories. Chronic hypertension antedates pregnancy, although it may first be diagnosed at the initiation of prenatal care. Pregnancy-induced hypertension occurs during the second half of a pregnancy and includes both hypertension without proteinuria and the many variants of the disorder preeclampsia. All forms of hypertension can complicate pregnancies by restricting fetal growth and may necessitate premature delivery when the health of either the mother or the fetus is in jeopardy. The risk of hypertensive complications of pregnancy increases steadily as women age; such complications are twice as likely among women 40 years of age or older as among younger women. Not surprisingly, the risk of delivering a low-birth-weight or preterm infant is increased among women in their 40s.

Stillbirth is the death of a fetus at or after the 20th week of gestation. Although stillbirth is a relatively uncommon outcome of pregnancy, advancing maternal age increases the risk significantly. Data from the National Center for Health Statistics, collected between 1997 and 1999, demonstrated rates of stillbirth of 4 per 1000 pregnancies in the maternal age range of 20 to 29 years and more than 10 per 1000 after 40 years of age.<sup>4</sup> Despite its relative rarity, stillbirth among older women is about 10 times as common as sudden infant death syndrome.

What, then, about the notion of delaying child-

bearing until a maternal age of 45, 50, or even 55 years? Endocrine studies indicate that most women enter menopause in their late 40s or early 50s. The rate of spontaneous conception is low and the risk of miscarriage is high among women 45 years of age or older, so where are these pregnancies coming from? Although some spontaneous conceptions continue to occur in women in this age group, most result from in vitro fertilization using eggs donated by a woman in her 20s or early 30s. Pregnancy rates among older women who choose this route are excellent, with the risks of both miscarriage and chromosomal abnormalities consistent with the age of the donor, rather than the recipient.

But the beaming faces of these older moms as they pose for their photo shoots belie three unspoken truths about pregnancy. The first is that these perimenopausal women are typically screened for underlying health risks before they are accepted into donor-egg programs. The presence of hypertension, diabetes, or a history of cancer often precludes participation.

Second, even among these healthy women, the rate of pregnancy complications is high. Pregnancy-induced hypertension has been reported in as many as 35 percent of women who become pregnant by means of donor-egg in vitro fertilization at 50 years of age or older.<sup>5</sup>

Finally, the cost of assisted reproduction restricts its availability to a small subgroup of the women who wish to bear children later in life. And it will be another 20 years before we can ask both parents and children from these perimenopausal pregnancies what it was like to face retirement and adolescence together. Recent advances in the ability to freeze eggs and the possibility that stem cells might some day yield oocytes may allow older women of the future to conceive children that are biologically their own, but these advances will not eliminate any of the concerns just described.

The American Society for Reproductive Medicine has begun a concerted effort to make the public more aware of the risks of delaying childbearing. So how should we counsel our young business-school student when she asks about her choices? Generally speaking, the decade between 25 and 35 years of age would seem to be ideal. A woman's education is typically complete, she has usually gained some experience in her professional arena, and pregnancy is at its safest. For women between 35 and 45 years of age for whom earlier childbearing is not an option, this decade remains safe enough that maternal age

alone should not be a contraindication to childbearing. However, women do face decreasing fertility and a moderate increase in the risks of miscarriage and chromosomal abnormalities as they pass 40 years of age. Perimenopausal and postmenopausal pregnancy remains an option for those women who are lucky enough to find themselves healthy and sufficiently wealthy to pursue it.

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## Minimal Intervention — Nurse-Midwives in the United States

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I first observed childbirth in 1973 during a rotation at the Boston Lying-In Hospital, where I witnessed many women in labor screaming in a scopolamine stupor. What I remember most vividly were not the physicians and nurses, competent though they may have been, but the British-trained nurse-midwives who practiced as labor nurses. Their competence, confidence, and compassion had a calming effect on everyone in the room (including this terrified student-nurse). The experience was so gripping, in fact, that I left the hallowed halls of New England Deaconess Hospital for the hollows of Kentucky to

enter the Frontier Nursing Service School of Nurse-Midwifery and become a certified nurse-midwife.

My earliest assumptions about the birthing process were somewhat naive; I soon learned that birth was not always as normal or uncomplicated as I had believed. A review of my student-midwifery log from 1977 detailing the first 100 births I attended bears out this lesson. The first six women mentioned had complications and conditions that included rape, severe preeclampsia, diabetes, gonorrhea, a complete abruptio placenta, disseminated intravascular coagulation, mental retardation, and arrested labor. All but one of these deliveries required close collaboration with physicians. Thanks to the attending physicians, midwifery “tutors,” and my training in managing “normal” births, all went well. Those early years indelibly impressed on me the importance of collegiality and collaboration.

Historically, the first nurse-midwives in this country were members of a pioneer profession that served the poor.<sup>1</sup> The most important period of development in nurse-midwifery began in the 1920s, when, in order to address high maternal and infant mortality, they provided maternity care in areas that lacked it. Turning to the British model of maternity care, the Frontier Nursing Service initiated the first nurse-midwifery program in the United States. Through the leadership of Mary Breckenridge, British-trained midwives were recruited to rural Kentucky to “safeguard the lives and health of mothers and children.” Their care resulted in marked reduc-



**Certified Nurse-Midwife Instructor and Two Student Nurse-Midwives Attending a Home Birth in East Harlem, 1950s.**

Courtesy of Ruth Beeman.