

On Women's Health and Rights  
Lectures, Speeches and Statements  
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## **WOMEN AND POPULATION CONCERNS FOR THE NEXT CENTURY**

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"And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living Thing that moveth upon the earth."

Genesis 2:28

And so they did. It took them some time though, but recently they have been very good at it. They needed thousands of years to reach the first billion. But it took only 123 years for the world population to pass from the first billion around 1804 to the second in 1927 (United Nations, 1994a). The next increment of 1 billion took 33 years. The world population reached 3 billion in 1960. The next billion took 14 years. The world population reached 4 billion at the time of the United Nations World

Population Conference at Bucharest in 1974. Only 13 years elapsed before the world population reached 5 billion (in 1987) and it is estimated that it will take only 11 years more for it to reach 6 billion (in 1998).

They have now subdued the earth and had dominion over every living thing upon it. Many are those who believe that they have even overdone it, and who are concerned that the health of the planet is now being compromised, and that the biological diversity on the earth is seriously threatened.

Now that the earth has been replenished and subdued, and the mission has been accomplished, they are left with no further explicit divine instruction. They have to steer their way, on their own, into the future.

To continue to be fruitful and multiply is no longer an option. World population growth, we can confidently assert, is bound to come to a halt. Its sustenance in the long term is clearly untenable. It has been calculated that if present levels of fertility, country by country, remain constant indefinitely, the global population could exceed 100 billion, by early in the twenty-second century (Demney, 1994). On the global level, the world population must eventually come to a stop: it must stabilize.

The *Homo sapiens* is already bracing up for the change. Human reproductive behavior is evolving fast to adapt to new dramatic realities. Fertility has been declining at an unprecedented steep rate, and is continuing to decline. Side by side with this fertility decline, and although it may seem paradoxical, world population will continue to grow, more than ever before, for at least another century, before finally stabilizing, probably toward the end of the twenty-second century.

The twenty-first century will witness major upheavals in world population, which will have an impact on a world that will never again be the same. The world will have to cope with a long- drawn and agonizing transition, characterized by rapid population growth, before population finally stabilizes. The world will have to prepare for the accommodation of almost double its current population size by making serious and painful adjustments, for sustainability and equity, in prevailing patterns of consumption and production. The reproductive *evolution* to a small family norm will have far reaching implications that need to be addressed. Women, finally emancipated from the heavy reproductive burden, will emerge as final winners in this major upheaval but only after an uphill struggle. A population-21 agenda for science will be critical to guide the passage of humanity, and particularly women, through a difficult next century.

## Fertility by Choice not by Chance

After having had her third child in Paris in 1792, the Countess of Sutherland wrote to her mother-in-law, "the French ladies are all astonished at how anybody can be '*si bête*' as to have '*trois infants*'. They are perfectly right and I shall mind what they say another time." (McLaren, 1990.)

It is appropriate to address these issues in a congress convened in France. The evidence suggests that France was the first nation to experience widespread fertility control because of female solidarity (McLaren 1990). French women clearly assumed that they have a right to control their bodies. Women of the world are now having or claiming this right.

### **POPULATION CONCERNS FOR THE NEXT CENTURY**

Three major concerns will need to be addressed: curbing rapid population growth, coping with numbers, and adapting to the reproductive evolution.

## **POPULATION CONCERNS FOR THE NEXT CENTURY**

- **Curbing rapid population growth**
- **Coping with numbers**
- **Adapting to the reproductive evolution**

### **CURBING RAPID POPULATION GROWTH**

More attention is given in the population debate on consequences of population growth, while less attention is given to the components of population growth.

## **COMPONENTS OF POPULATION GROWTH**

- **MORTALITY DECLINE**
- **POPULATION MOMENTUM**
- **WANTED FERTILITY**
- **COERCED MOTHERHOOD**
- **UNWANTED FERTILITY**

To act effectively to curb rapid population growth, it is important to differentiate between its various components. One component of population growth, resulting from *mortality decline*, is in fact desirable and should be encouraged. Another major component, resulting from the *population momentum* of the young age structure, can be considered inevitable. A third component, resulting from *wanted fertility* should be accepted as a penalty for the inequity in this world, until socio-economic conditions inductive to a small family norm prevail. A fourth component, resulting from *coerced motherhood* by denying women any choice in life beyond childbearing, is unacceptable, and should not be allowed to stand. A fifth component, resulting from *unwanted pregnancies* and an *unmet need for fertility regulation* is, by definition, undesirable, unacceptable and should be corrected.

Mortality rates are projected to continue their decline in the twenty-first century in developing countries. This trend is to be encouraged and cannot be manipulated to curb population growth.

It has been estimated that the population momentum will be responsible for about one half of the population growth in the next century (Population Council, 1994). Record numbers of young people will enter the childbearing years, and even if they adopt a small family norm, the number of births will still be large.

A desire for more than two children is still a norm in most of the developing world. The desire is completely rational where socio-economic conditions make the "cost" of children less than their "value". The ideational change for a smaller family norm appears, however, to be spreading in the developing world, with even small improvements in socio-economic conditions. The success of family planning in Bangladesh is a case in point (Larson and Mitra, 1992).

When societies allow women only one choice in life, childbearing and childrearing, and make children the only goods they can produce and they are expected to deliver, fertility cannot be a real choice. It is only recently that the world is realizing the heavy price it is paying for not empowering women to make decisions in their lives, including reproductive decisions.

**“Advancing gender equality and equity and the empowerment of women, and the elimination of all kinds of violence against women, and ensuring women's ability to control their own fertility, are cornerstones of population and development-related programs.”**

Cairo International Conference on Population and Development  
ICPD, 1994

The Cairo International Conference on Population and Development ICPD, 1994, upheld the principle that

*"Advancing gender equality and equity and the empowerment of women, and the elimination of all kinds of violence against women, and ensuring women's ability to control their own fertility, are cornerstones of population and development-related programs."*

### **The unmet need for family planning**

A recent analysis of data derived from Demographic and Health Surveys, using conservative estimates for the unmet need for limiting fertility and for spacing births, estimated the unmet need to be 24 percent in sub-Saharan Africa, 13 percent in Asia and North Africa, and 16 percent in Latin America. The same study concluded that the total unmet need for contraception could be close to or in excess of 100 million (Bongaarts, 1991).

There will be a major expansion in the need for family planning in the coming decades (Fathalla, 1992). It should be a responsibility of the whole international community to ensure that women, wherever they are, are given a choice in their lives and are given the means to implement their choice. Even the poorest people in the world should make these choices. There is no justification in denying poor people access to family planning.

## POPULATION CONCERNS FOR THE NEXT CENTURY

- Curbing rapid population growth
- Coping with numbers
- Adapting to the reproductive evolution

### COPING WITH NUMBERS

In 1803, Malthus wrote the following parable on social entitlements:

*"A man who is born into a world already possessed, if he cannot get subsistence from his parents on whom he had a just demand, and if the society do not want his labour, has no claim of right to the smallest portion of food, and, in fact, has no business to be where he is. At nature's mighty feast there is no vacant cover for him. She tells him to be gone, and will quickly execute her own orders, if he does not work upon the compassion of some of her guests. If these guests get up and make room for him, other intruders immediately appear demanding the same favour. The report of a provision for all that come fills the hall with numerous claimants. The order and harmony of the feast is disturbed, the plenty that before reigned is changed into scarcity; and the happiness of the guests is destroyed by the spectacle of misery and dependence in every part of the hall, and by the clamorous importunity of those, who are justly enraged at not finding the provision which they had been taught to expect. The guests learn too late their error, in counteracting those strict orders to all intruders, issued by the great mistress of the feast, who, wishing that all her guests should have plenty, and knowing that she could not provide for unlimited numbers, humanely refused to admit fresh comers when her table was already full." (Malthus, 1803).*

Malthus was right on at least one account and was wrong on at least one account. He was right in that there is going to be a limit on the number that can be seated on Spaceship Earth, and in fact people have already heeded the message and are already changing their reproductive patterns

to meet the new reality. He was wrong on how big that number can be. At the time Malthus made this statement, the population of the world was an estimated one billion. "Nature's mighty feast" now accommodates, and serves, at least as well, 5.7 billion. Within the next two centuries, it is projected that this number will, probably inevitably, double.

### Population growth

It may seem paradoxical that the world population continues to grow in spite of the continued fertility decline. Because of the fertility decline, birth *rates* will continue to decline in the twenty-first century.

Crude birth rate (per 1000 population)  
United Nations, 1992

	1990-95	2020-25
World total	26.5	17.9
More developed regions	14.2	11.9
Less developed regions	29.4	19.1

The annual average *number* of births will, however, continue to increase mainly as a consequence of the increasing number of women of reproductive age, which itself resulted from the high fertility of the past. The increase in the number of births, together with the effects of declining mortality, will continue to fuel the increments in population size despite the decline in fertility rates.

World population growth will not stop in our lifetime. It is also unlikely to stop in the lifetime of our children. It may not even make the ultimate stop in the lifetime of our grandchildren. In recent United Nations long-range population projections, it is assumed that fertility will ultimately stabilize at the replacement level (i.e. when the two parents produce only two children to replace them) around the year 2100 (United Nations, 1994a). Population will continue to grow for some time, even after fertility rates drop to simple replacement levels.

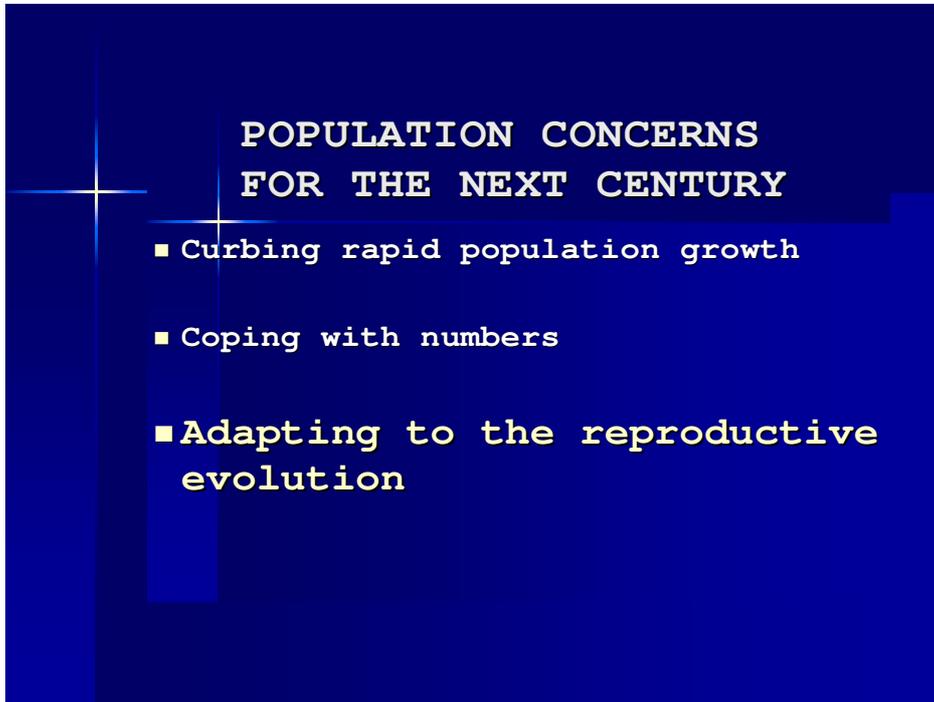
## World Population Projections

	% increase	Population size
1990-2050	89	10 billion
2050-2100	12	11.2
2100-2150	3	11.5

It is thus projected that the world population will increase by 89 per cent between 1990 and 2050, reaching a size of 10 billion, then expands by 12 per cent during the following 50 years (2050-2100) to a size of 11.2 billion, and by 3 per cent during the next 50 years (2100-2150) to a size of 11.5 billion. The world population may stabilize ultimately at 11.6 billion shortly after the year 2200 (United Nations, 1994a). World population will thus continue to grow for another two centuries from now, and our crowded planet will have to accommodate about twice its current population.

Many are those who believe that these numbers are beyond the *carrying capacity* of planet earth. Others, including the speaker, believe that it is our *caring capacity*, for others and for future generations, that will make the difference. As stated in the Programme of Action of the Cairo ICPD, "*Recognizing the longer term realities and implications of current actions, the development challenge is to meet the needs of present generations and improve their quality of life without compromising the ability of future generations to meet their own needs*" (United Nations, 1994b). There is no question that current consumption and production patterns are unsustainable. They must change to foster sustainable resource use and to prevent environmental degradation. In this major challenge for the twenty-first century, as reaffirmed by the Cairo ICPD Programme of Action, "*Developed countries should take the lead in achieving sustainable consumption patterns and effective waste management.*"

In addition, the large numbers will bring new realities that need to be faced. The world demographic map will be re-drawn. The world will become more urban. "Mega cities" will increase in size and number. More people will be on the move than ever before.



#### **ADAPTING TO THE REPRODUCTIVE EVOLUTION**

The biological potential of human reproduction can be great. According to the Guinness Book of World Records *"a 32nd child was born to Raimundo Carnauba and his wife Madelena of Ceilandria, Brazil. In May 1972, the mother said "They have given us a lot of work and worry but they are worth it." The father, typical to his limited investment in the big enterprise, said "I don't know why people make such a fuss."*

A dramatic change in people's reproductive behavior began in the nineteenth century in the North of our globe. During the second half of the twentieth century, the change has been sweeping the South. The world is experiencing an unprecedented decline in fertility. Fertility level is measured by demographers as the total fertility rate (TFR), which reflects the average total number of children that a woman would have by the end of her reproductive life if current fertility patterns remain unchanged. The total fertility rate continued to decline in all of the world regions in recent decades, and is expected to continue to do so in the coming years and to drop to 2.36 by the year 2020-2025.

	Total fertility rates		
	Estimates 1950-1990 and		
	Medium variant projections 1990-2025		
	1950-1955	1985-1990	2020-2025
World Total	5.00	3.43	2.36
More developed regions	2.83	1.92	1.90
Less developed regions	6.19	3.90	2.44

To put the rate of fertility decline in developing countries in perspective, a recent study compared the time taken for fertility to decline from 6.5 to 3.5 in different countries. What took 58 years in the USA took 27 years in Indonesia, 15 years in Colombia, 8 years in Thailand, and merely 7 years in China (UNFPA, 1991).

The adoption of a smaller family norm, with consequent decline in total fertility, should not be viewed only in demographic terms. It means that people, and particularly women, are empowered to take control of their fertility and to plan their lives; it means that more children are born by choice, not by chance, and that births can be planned to take place at optimal times for childbearing to ensure better health for women and children; and it means that families are able to invest relatively more in a smaller number of beloved children, trying to prepare them for a better future (Fathalla, 1993, 1994b, 1994c).

What we are witnessing is a major *evolutionary* jump that is science-mediated, rather than brutally imposed by Nature. Our reproductive function is being voluntarily adapted to dramatic new realities.

The Homo sapiens has escaped the grip of Nature in evolution to become a self-evolving animal. The recent dramatic evolution in human reproductive behavior is not followed or accompanied by a change in the anatomy and/or function of the reproductive system, as would have been expected in other major evolutionary jumps mediated by Mother Nature. As a consequence, the Homo sapiens has to accomplish its reproductive evolution while retaining a reproductive system geared to high fertility.

<b>ADAPTING TO THE REPRODUCTIVE EVOLUTION</b>	
	<ul style="list-style-type: none"> <li>■ <b>Contraceptive life</b></li> <li>■ <b>Quality in births will substitute the demand for quantity</b></li> <li>■ <b>Sex: A duty became a pleasure</b></li> <li>■ <b>Greying of the world</b></li> <li>■ <b>Adolescence and the widening "bio-social" gap</b></li> </ul>

Women, or their partners, have to use contraception. Women have a span of about 30 reproductive years, during which they were meant by Nature to get pregnant. If women are to bear only one or two children, they will spend only one to three years in childbearing. For the remaining years, they, or their partners, will have to lead a contraceptive life if they are to remain sexually active. Contraceptive technology, from now on, will play a crucial role in reproductive life. Contraception will be a way of life.

With the adoption of a small family norm, the demand for quality in births will substitute the demand for quantity. New developments in reproductive technologies can help more people to have the healthy babies they want, but the technologies can also be abused. Sex, as a tool for reproduction, is evolving into an expression of love, with consequent changes in sexual behavior.

As a consequence of changes in age structure, low fertility societies will experience the "greying" of their populations. Adolescence, as an age group, will increase during the demographic transition, and the widening bio-social gap in reaching maturity will have important implications.

### **Contraceptive life**

The change to contraceptive life has been sweeping the world. Levels of contraceptive use are estimated as percentages of currently married women of reproductive age (15-49), including where possible, those in consensual unions. According to the latest United Nations estimates, of the 899 million currently married women of reproductive age in the world, 57

percent are using contraception at any one time (United Nations, 1994c). The prevalence among developing countries as a whole is 53 percent, and in the more developed countries 72 percent.

### World Contraceptive Use 1998

(United Nations 1999)

	Couples in reproductive ages in 1995 (millions)	Level of contraceptive use (Percentage)
World	982.2	58
Less developed regions	799.2	55
More developed regions	183.0	70

### Level of current contraceptive use %

United Nations, 1999

	World	Less develop.	More develop.
Total	58	55	70
Female steriliz	19	21	9
Male sterilizat	4	4	5
Pill	8	6	17
IUD	13	14	6
Condom	4	2	14
Other	11	7	21

The date to which these estimates pertain is approximately 1990, according to data available through 1993. Considering the lag between the time of data collection and the current period, the level of contraceptive use in the developing countries is likely to have been about 55 per cent in 1993 (United Nations, 1994b).

Regional differences in levels of use remain large. While there remain many countries in Africa and several in other regions where the level of contraceptive use is still very low, most developing countries that have available data on trends have experienced a substantial increase in the level of contraceptive use. Even in sub-Saharan Africa, recent surveys show an increase in levels of use in several countries: Botswana, Cameroon, Kenya, Lesotho, Namibia, Rwanda, Swaziland, South Africa and Zimbabwe.

### ***Contraceptive safety***

In view of the major worldwide expansion in the use of modern methods of contraception by healthy women over prolonged periods of time, contraceptive safety has become an important issue in women's health. In developed countries, where the number of women using contraceptives is much larger than the number of those who are pregnant, and where maternal mortality rates are very low, reproductive mortality attributable to contraceptive use assumes a relatively larger dimension (Beral, 1979). In developing countries, reproductive mortality attributable to contraceptive use is still insignificant compared with maternal mortality.

### ***The contraceptive technology revolution***

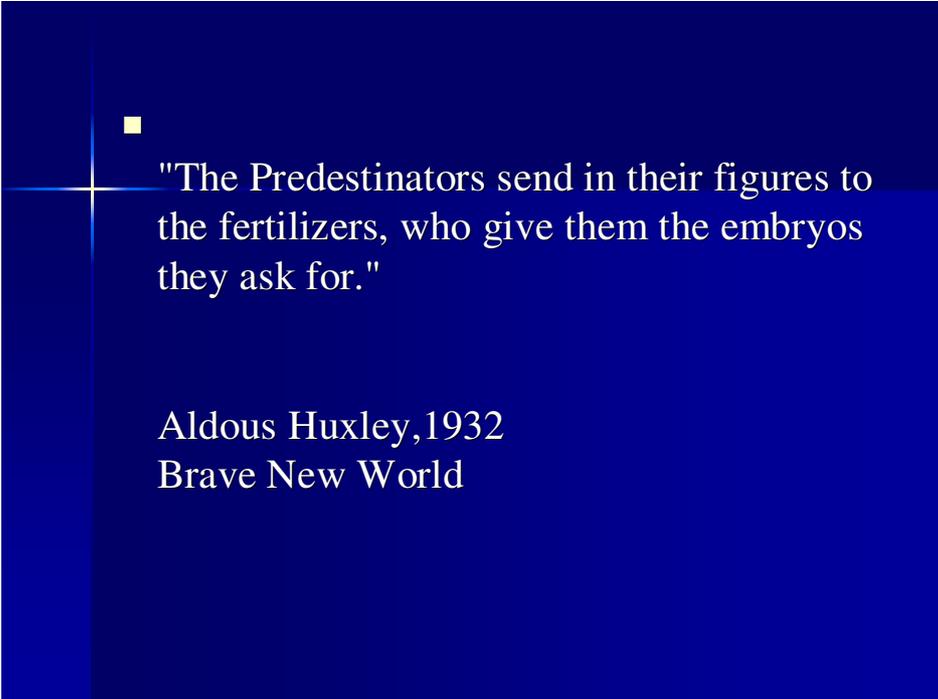
A scientific revolution in contraceptive technology in the past few decades has helped these hundreds of millions of people to achieve their aspirations to regulate and control their fertility. The fruits of science have been enjoyed by people living in the most varied circumstances: in the skyscrapers of Manhattan, in peri-urban slums in Latin America, in rural communities of the Indian subcontinent; people in all socio-economic strata; people with different cultures, religious beliefs and value systems; and people postponing a first pregnancy, spacing their children or putting the limit on childbearing.

Until the middle of the present century, contraceptive choice was limited to either coitus-related methods which lacked in effectiveness, or permanent methods. Contraceptive choices have now been broadened (Fathalla, 1994a). Contraception was moved outside the bedroom by the development of systemic methods such as the pill. People no longer had to make the choice between a method to be used at every coitus or a permanent method; long-acting reversible methods now offer protection ranging from one month to several years. Also, highly effective but reversible methods became an available option. Technical developments

have allowed sterilization to be performed as out-patient procedure and without the need for general anaesthesia.

But perhaps the most significant development, brought about by the contraceptive technology revolution, has been the empowerment of women. For the first time, women had at their disposal effective methods that *they* can use to regulate and control their fertility, without being too dependent on cooperation of the male partner. Methods used by women now make up most of contraceptive practice worldwide, and such methods have been increasing their share in total contraceptive use.

### **The embryos they ask for**



■ "The Predestinators send in their figures to the fertilizers, who give them the embryos they ask for."

Aldous Huxley, 1932  
Brave New World

Aldous Huxley's vision of a brave new world, where people get *the embryos they ask for*, is not too far away. New frontiers of science have opened the way for hitherto unimaginable reproductive technologies that made possible artificial insemination, in vitro fertilization, embryo transfers, surrogate motherhood, cryogenic storage of sperm and ova, genetic selection, and prenatal diagnosis, including sex determination.

With the adoption of a small family norm, demand for quality of births has substituted for quantity of births. To seek the birth, through the use of these new technologies, of only healthy babies is a legitimate request. The new technologies may, however, be abused.

Although most of these technologies have as yet no significant

demographic impact, there is already serious concern about possible alterations in sex composition of populations, when the desire for quality is translated as a desire for a son.

In a number of countries, the practice has taken a large dimension. In 1988-89 the sex ratio for first-born children was 104.9 in China and 107.2 in Korea, but for the fourth child or higher birth order, it was 131.7 and 199.1 respectively.

Reported sex ratios at birth by birth order  
in China and South Korea  
(Zeng, Yi et al., 1993)

Country Year	1st	2nd	3rd	4th	All births
Korea 1988	107.2	113.5	170.5	199.1	113.6
China 1989	104.9	120.9	124.6	131.7	113.8

In India, the practice became so prevalent that the government felt the obligation to introduce legislation to make it punishable by law.

### **Sex: A duty became a pleasure**

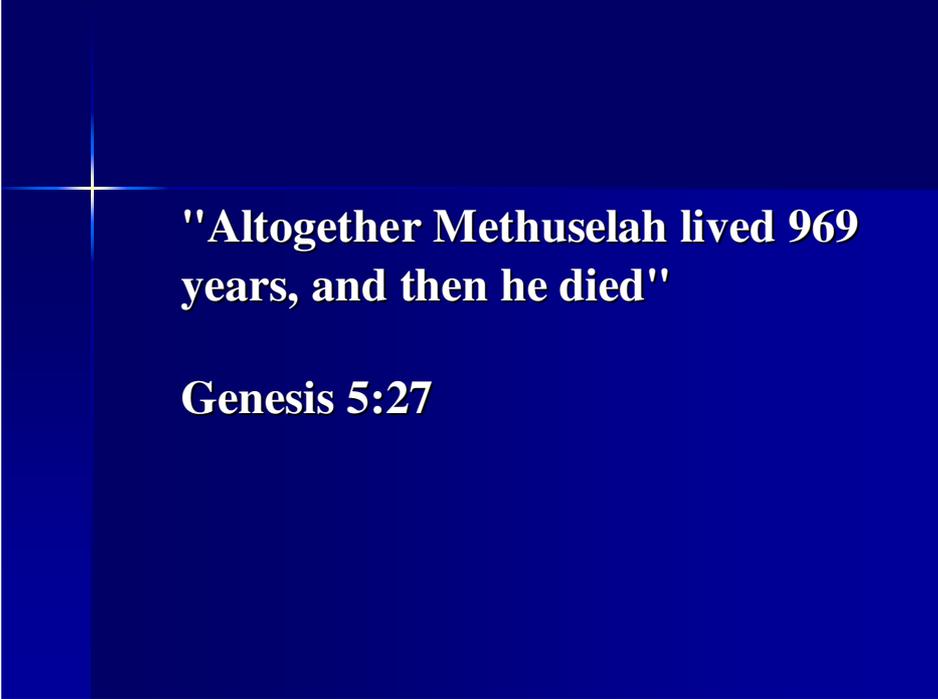
In the evolution of the Homo sapiens, the temporal relationship between sex and reproduction has been severed. It must have taken our ancestors such a long time to realize any relationship between the act and the event, probably not until they began to observe domesticated animals. In our fellow mammals, the female will only be attractive to the male and receptive to his advances if she is ovulating and ready to conceive. In our fellow primates, the female never fails to advertise the fact that she is ovulating. External sexual organs undergo a change in size and/ or colour that is clearly visible and that makes her sexually attractive to the male. At other times, she will have little or no appeal for him. The sexual receptivity of the human female has completely emancipated from hormonal control. The human female has also succeeded though evolution

to hide completely all external evidence of ovulation.

The dissociation of the act of sex from reproduction was an ingenious mechanism for reproductive efficiency. Mother Nature was not as much keen on our pleasure, as on ensuring the survival of the species. Making sex perpetually available encouraged the pair bond and favoured the development of the family institution, as an essential mechanism for care of the children. Other mammals produce infants who are able to run sufficiently well to keep up with the herd less than thirty minutes after birth. The human newborn, on the other hand, has a long period of years of extreme dependence and helplessness during which it needs to be taken care of, preferably by two parents, before being able to survive on its own.

With reproduction receding further in the background, the role of sex in our lives is going to evolve further. It will sublime into an expression of love. As such, sex will increasingly be an important component in our psycho-social well-being, and less and less a tool of reproduction. We are beginning to witness the implications of this evolution for sexual behavior.

### **Greying of the world**



**"Altogether Methuselah lived 969  
years, and then he died"**

**Genesis 5:27**

The record of Methuselah remains unbroken. The world, however, has recently been making good progress. People are now living longer, almost everywhere and life expectancy is expected to continue to increase. With proportionately less people born and proportionately more people living longer, the "greying" of the world will continue in the twenty-first century.

It is estimated that as of mid-1990, about 1 out of every 3 persons on the earth was a child, one out of 5 was a person in the late teens or early twenties and 1 out of 16 was aged 65 or older (United Nations, 1992ab). The median age was 24 years, indicating that the world population is still relatively young. This is rapidly changing. The world is getting older.

The size of the world elderly population is currently considerably smaller than the size of the child population. The projected speed of relative increase of the world elderly population, however, is substantially faster than that of the world child population. The number of persons aged 65 or over in the world was estimated to be 328 million in 1990. It is projected to grow to 828 million in 2025, more than 2.5 times its current size (United Nations, 1992ab).

### "Over-70 Club":

<u>Year</u>	<u>Number of country members</u>
• 1950-55	5
• 1980-1985	47
• 2020-2025	102

In 1950-1955 only five countries (Denmark, Iceland, Netherlands, Norway and Sweden) belonged to what is called the "*Over-70s Club*", that is, the countries in which life expectancy at birth is more than 70 years. By 1980-1985, the number of these countries had increased to 47, with 9 in Latin America, 6 in Asia, 32 in Europe, North America and Oceania, and none in Africa. In 2020-2025, the Club's membership is projected to grow to 102, including the 32 currently industrialized countries (United Nations, 1989).

The growing proportion of aged people imposes new demands. Societies have to make difficult decisions on allocation of resources, and to struggle

with a formula to establish a reasonable degree of *intergenerational equity*.

### **Adolescence and the widening "bio-social" gap**

Nature has delayed the onset of puberty in the human species more than in any other mammal, to ensure physical and mental maturity in the mother (and father) and to allow enough time for the transmission of intergenerational knowledge and skills, before taking on the responsibility of parenthood.

During the period of adolescence, defined as the period of transition from childhood to adulthood, three developments take place. Biological development progresses from the point of the initial appearance of the secondary sex characteristics to that of sexual maturity; psychological processes and cognitive and emotional patterns develop from those of a child to those of an adult; and a transition is made from the state of total socio-economic dependence to one of relative independence. Two trends are taking place in almost every society, though at different paces: a trend towards an earlier onset of *biological maturation* and a trend towards delay in *socio-economic maturation*, with a resultant wider bio-social gap in human development. Today, girls everywhere are becoming sexually mature at an earlier age than previous generations. Genetic, health and socio-economic factors influence the wide variations in age of menarche among different countries. Since boys and girls have now to spend more years in school, learning and training, before they can enter the complex labour market, the period of socio-economic dependence is prolonged. The bio-social gap will continue to widen for other world regions, where the gap is still narrow.

Adolescents are left with difficult choices in sexual behavior: premarital sex, early marriage or abstinence. The different patterns predominate in different countries, and patterns of transition exist.

Adolescence and the widening bio-social gap are not a problem in themselves. The problem is in the need to come to grips with the new realities of adolescence. Misconceptions are contributing to turning what should be a normal positive phase in growth and development into a problem.

**THE WINNERS: WOMEN**

*"But first we must ask: what is a woman? "Tota mulier in utero", says one, "woman is womb"."*

Simone de Beauvoir, 1949. *The second sex*

In this upheaval in population and reproductive behavior, there is one clear winner to emerge: women.

They deserve to be the winners. They were the ones who made the sacrifices in the battle for survival of our species. They still make these sacrifices, unnecessarily, even today, as evidenced by the world estimates of maternal mortality (World Health Organization, 1991). It may not be sufficiently realized that only for the birth of the 5.7 billion people who are now living, replenishing the earth and subduing it, more than 25 million women had to die, not to talk about those who suffered but survived.

With the adoption of the small family norm, and with the ability of women to regulate and control their fertility, the woman is finally emerging from behind the mother. Hitherto, women's potential has been suppressed to serve the survival needs of humanity. It is high time they are permitted to make their choices, in their own interest and in the interest of all. Childbearing is becoming a function of women, and not the function of women. Women are becoming producers, and not only reproducers. The world is making the discovery that women are not mobile wombs. They are human beings, on their own right. There will continue to be for some time those who cannot accept a role for women, other than being satellites that have to move around men. Women still have an uphill struggle, but there is no turn back.

**POPULATION-21: AN AGENDA FOR SCIENCE**

## Population 21: An Agenda for Science

Challenges in reproductive biology:

- Contraception-21
- Is the female reproductive system becoming obsolete?
- Biology and the mature woman

Success in replenishing the earth was largely an accomplishment of science. It was not brought about by increased fertility, but by decreased mortality. With more people surviving to reproductive age, more children were born. Now that the battle for survival has been won, science has the challenge to guide humanity in the new era.

Unprecedented changes in world population, on a hitherto unknown scale, are taking place and will continue to gather momentum in the twenty-first century. Science has not yet kept pace with the changes, and research is needed in almost all disciplines. But new frontiers are opening for science.

**“Science progresses in proportion to the mass of knowledge that is left to it by preceding generations, that is under the most ordinary circumstances in geometrical proportion.”**

Friedrich Engels

In the field of reproductive biology, a research agenda is needed to help the world to adapt to the reproductive evolution. New contraceptives are needed in the twenty-first century. The female reproductive system has to cope with new reproductive patterns. The mature woman has new biological needs that must be addressed.

### **Contraception-21**

Current contraceptive "hardware" (methods) used with improved software (service delivery approaches) together with a few developments now at the end of the research pipeline, can carry us through the end of this century but will fall far short in meeting the agenda for the 21st century. According to current population projections, the next few decades will witness the entry of more new contraceptive users than in any comparable time in human history, past or future.

The need for new contraceptive methods is not because currently available methods are not good, but because they are not adequate to meet the widely diverse needs of all the hundreds of millions of people using contraception now and in the future. There is not, and there probably will never be, an ideal method of contraception for all users, but there can be a variety of "ideal methods" for the needs of different users (Fathalla, 1990).

Science is ripe for a Contraception-21 initiative to launch a second contraceptive technology revolution (Fathalla, 1994a). While advances in cell and molecular biology and in biotechnology have opened new frontiers for medical and biological sciences, the field of contraceptive

research and development is yet to benefit from the opportunities provided by these new advances.

There are four main events in the reproductive process that can be targeted in contraceptive approaches: ovulation, production and maturation of sperm, meeting of the ovum and sperm (fertilization), and implantation of the fertilized ovum. Only the process of ovulation has been so far successfully targeted by modern science. New frontiers now opening up in science can provide novel ways to target the other events in the process that have not yet been exploited and to provide women and men with a broader choice of better state-of-the-art contraceptives.

The second contraceptive technology revolution should not be demographic-driven or completely science-driven. It should be driven by a *woman-centered approach*, to provide women and men with the contraceptive technologies they need and they miss in currently available methods (Fathalla, 1994a, 1994d).

### **Is the female reproductive system becoming obsolete?**

The human female was well equipped, through evolution, with a reproductive system geared to high fertility and efficient reproduction. It has served her well in the past. It may become more of a burden in the future.

In primitive human societies, a woman was meant to menstruate only few times in her life. The rest of her childbearing years were to be spent either in pregnancy or lactational amenorrhoea. In the modern reproductive evolution, the uterus may be utilized for childbearing only once or twice in a lifetime. The breast may or may not be used at all for its physiological function. Ovulations and menstrual cycles will continue when there is no chance or desire to conceive.

Strong evidence links incessant ovulation to the occurrence of the common ovarian epithelial, benign and malignant, tumours (Fathalla, 1971). The relation of endometrial cancer to nulliparity is well-established. A protective effect of breastfeeding on the development of breast cancer has been reported. The length of the interval between menarche and childbearing has been incriminated in the etiology of breast cancer.

Contraceptives of the future will have not only to protect women against conception, but also help the reproductive system to adapt to the changing role. An example is the protective effect of the oral contraceptive pill on ovarian and endometrial cancer which is now established.

### **Biology and the mature woman**

Women live, on average, longer than men, in both developed and developing countries. United Nations projections indicate that this trend will continue in the twenty-first century. This advantage of women is variously attributed to an inherent biological advantage, a more healthy life-style behavior (less consumption of alcohol and tobacco), and to environmental factors (more dangerous work activities performed by men).

The human female was not well equipped in evolution for this extended longevity. Cessation of ovarian function, and the menopause, was probably imposed by Nature on the human female, on the basis of life expectancy assessment. To ensure that a newborn gets good care from a living and healthy mother, Nature put a limit to the ability of women to bear children after a certain age, by stopping ovarian function. Women in many countries now, and in more countries in the twenty-first century, can confidently expect to lead a healthy life for more than 20 years after the menopause.

The human female will now have to lead long years of life without the benefit of the endogenous production of oestrogen, making her more liable to bone fragility and cardiovascular disease, apart from other impact on quality of life. Hormone replacement therapy is becoming available to correct this hormonal deficiency, but scientific progress is still needed to develop hormonal preparations that target tissues where the beneficial effect is needed and that leave out tissues where the exogenous therapy can have adverse effects.

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