

## GLOBAL POPULATION GROWTH - IS IT SUSTAINABLE?

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY 22ND OCTOBER 2007

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### Is population growth a problem?

Global population grows more rapidly now (217,000 more births than deaths each day) than in the 1960s (165,000 more). Rapid population growth used to command wide attention, but today it meets a collective yawn.

Ninety-nine per cent of the projected growth in population by 2050 will take place in the developing world. Already 1.2 billion lack access to clean water. By 2025 a staggering 3 billion people will be short of water.

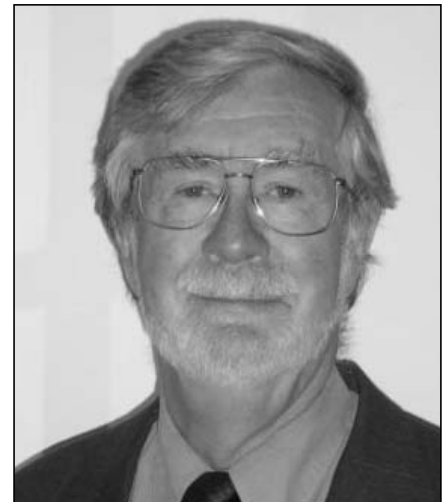
Population projections depend on calculating the total fertility rate (TFR) – the average number of children a woman will have over her fertile life, based on current age-specific fertility rates. The Ethiopian TFR is 5.4. The population has multiplied 15 times since 1900 and unless family planning receives more attention it will reach 145 million in 2050. Already, 8 million Ethiopians depend on external food aid. Niger has a TFR of 8. Four out of 10 children are malnourished and 84% of adults are illiterate. If the TFR falls to 3.6 the population will grow from 14 million today to 50 million in 2050: if it remains constant there will be 80 million.

For the 2 billion people living on 50p a day or less, future population growth is unsustainable. The rich also face formidable problems. World Bank projections suggest a four-fold increase in the global domestic product in the next 50 years. Past growth has depended on doubling oil output

every decade. Petroleum geologists suggest oil production could peak as early as 2020. Perhaps less profligate use and alternative sources of energy will keep pace with demand, but if they do not the world economy could spiral downwards.

Some scientists suggest that human activity exceeded the Earth's capacity to support it in 1985. Such predictions have wide margins of error and even bringing today's global population to western standards of consumption and pollution would probably exceed the world's resources. In 1993, a Population Summit of 60 national scientific academies, including the Royal Society, issued a sombre warning, "science and technology may not be able to prevent irreversible degradation and continued poverty for much of the world." The Academies recommended "zero population growth within the lifetime of our children."

Unfortunately, a year later the International Conference on Population and Development in Cairo did not listen to the world's scientists. Women advocates "redefined" population, framing anything to do with "population" as intrinsically coercive, and even the word "demographic" became politically incorrect. Compelling evidence of the success of family planning programmes was ignored, or criticised as "target driven". It was asserted that fertility decline would occur when holistic social and health goals were reached.



In Kenya, prior to Cairo, when family planning was emphasised, the TFR fell from 8 to below 5. After Cairo, family planning budgets dropped, unwanted births doubled, and the fall in the TFR stalled. The population in 2050 could be 83 million instead of 44 million. Unless there is a renaissance of interest and investment in family planning, Kenya will become a failed state, like Somalia and the Congo.

Last year, the All Party Parliamentary Group on Population, Development and Reproductive Health held hearings on the impact of population growth on the Millennium Development Goals. After taking a great deal of expert evidence, they concluded that it is "difficult or impossible" to achieve the MDGs in high fertility countries.

If population growth is a problem can anything be done about it?

In the 1960s offering family planning to lower birth rates in the absence of socio-economic improvements was dubbed "wishful thinking". Now we know that socio-economic changes are not a prerequisite for dropping the birth rate. In fact, some countries cannot get out of poverty unless population growth is slowed. As a result of rapid population growth,

developing countries need 2 million more teachers annually, just to hold class size constant.

Slowing population growth pays what has been called a demographic dividend. Individuals with smaller families have more income to invest and a rapid fall in the birth rate produces a relatively large work force. When all the other parameters are fixed demographic changes by themselves pushed the savings rate in Taiwan higher than in the US or France where the birth rate fell more slowly. It is precisely the countries that have been able to slow population growth, which are now undergoing rapid economic expansion, and often becoming more democratic.

Jeffrey Sachs writes in *The End of Poverty*, “. . . that impoverished families choose to have lots of children.” But, the decision to have a child is not like choosing to buy a car, where the person balances their finances against their perceived need. Sex is often irrational and passionate, and human beings have sexual intercourse up to a thousand times more frequently than is necessary to conceive the children they want. Having a child is not a single decision made one night to *turn fertility on*, but a difficult, consistent, prolonged struggle to *turn fertility off*. Impoverished families have “lots of children” not because they want them, but because they do not have access to modern contraceptives to turn fertility off.

Over the past decade the disparities in family size between rich and poor in developing countries have increased – implying less education for the children of the poor, more hunger, more women dying and more infants dying. The poor use contraception less, but the statistics also show that they have a much greater unmet need for family planning, suggesting it is

lack of access to contraception, not a desire for bigger families which is driving the disparity. Family planning is often over-medicalised raising innumerable, unnecessary obstacles between women and the methods they need. Providers, fearful a woman might be pregnant, often refuse contraceptive advice unless she is menstruating when she visits the clinic.

## India and Iran

India was the first nation to develop a national population policy, but it still grew from 357 million to over one billion in 50 years. The government built a top-down national programme around western trained physicians, while most of India's population growth is in rural areas where there are no doctors. Instead of correcting this shortcoming, Indira Gandhi's government used coercive measures to meet demographic targets, leading to election defeat in 1977. The Islamic Republic of Iran was one of the last countries to confront rapid population growth. In 1988, Ayatollah Khomeini was persuaded to adopt a national family planning policy: contraceptive factories were built, every newlywed couple is required to attend family planning instruction, and appropriately trained health workers are stationed in the rural areas. Iranian family size fell from six to two - as rapidly as in China, but without any coercion.

*The 9/11 Commission Report* called “a large, steadily increasing population of young men [is] a sure prescription for social turbulence.” Pakistan, which never had a well-organised family planning programme, will more than double its population by 2050 and become increasingly violent. Iran,

The Report of Hearings by the All Party Group on Population, Development and Reproductive Health (*Return of the Population Growth factor: Its Impact upon the Millennium Development Goals*) is on the web at [www.appg-popdevrh.org.uk](http://www.appg-popdevrh.org.uk)

which now has more women than men in universities, and, along with much slower population growth, is likely to be increasingly stable. Iran demonstrates that a pack of oral contraceptives and access to voluntary sterilisation can help start a social revolution from within. Ultimately, the Pill is mightier than the sword.

## Reasons for hope

The wonderful discovery of the past 50 years has been that people all over the world want voluntary family planning. Tragically, 200 million women, almost all in poor countries, cannot get access to the choices they need and deserve.

It is imperative to make as wide a range of fertility regulation options available, through as wide a range of distribution channels as resources permit. Priority must be given to ensuring modern contraceptives and the information people need to use them. Government services are overloaded, have weak logistics and lack incentives, and the very poor tend to use the private/informal health sector. As the All Party Report points out, an emphasis on Sector-Wide Approaches (SWAs) in foreign aid misses some of the poorest and most vulnerable groups.

As the world's scientific academies foresaw a decade and a half ago, and as the All Party Group reiterated in January this year, without a significant slowing of population growth we face “irreversible degradation of the natural environment and continued poverty for much of the world.” Building on the All Party Report, there is no better place in the world to make this happen than here, in the mother of Parliaments.

# Lessons from China

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Currently 1.7 billion people live in countries where the Total Fertility Rate is between three and five children for every woman of reproductive age. A further 740 million people live in countries where the TFR is greater than five. Almost all of these countries are among the least developed and this level of population growth is unsustainable, given limited natural resources. China is the only country to have taken sustained, enforced and sometimes controversial measures to control its growing population. The question is does China's experience of population control have any relevance for those countries facing rapid population growth today?

## Before the One Child Policy

China had some lessons for other countries long before the One Child Policy was instigated. When Mao Ze Dong came to power in 1949 he inherited an impoverished country, which had been ravaged by decades of civil war, not unlike many of the countries with highest population growth today. He believed that human resources would have to be China's main weapon in the widely predicted Third World War. So couples were encouraged to have large families with the result that in the early Mao years fertility was very high. From 1950 to 1970 the population increased from 540 million to 850 million, as a

consequence of high fertility, and improved survival, resulting from relative societal stability, food security and improved public health measures.

Concerns about this rapid growth and particularly the possibility of food shortages, led to the "Late, Long, Few" policy in 1970. This was a *voluntary* policy focusing on late marriage, a long gap between children and fewer children. This was underpinned by easy access to contraception, and while there was considerable social pressure to comply, there was no coercion. As a result fertility rates dropped dramatically in just a decade from 5.8 in 1970 to 2.9 in 1979. But the population continued to grow because the baby boomers of the 50s and 60s were entering their reproductive years, and by 1979 two-thirds of the population were under 30.

This worried Deng Xiao Ping, who assumed power in 1978, and prepared to embark on a hugely ambitious economic reform programme. He recognised that curbing population growth was essential for economic expansion and improved living standards. So he introduced the One Child Policy.

## What is the One Child Policy?

The One Child Policy is a set of rules and regulations governing approved family size. The State Family Planning

Bureau sets targets and policy direction, but implementation is the responsibility of local family planning committees, so there is great variation in implementation. The one child rule applies only to urban areas and to government workers. Two children are allowed in most rural areas, which applies to around 70% of the population. There are a number of exceptions to the Policy. This includes ethnic groups, certain occupations like mining, and where the first child has a disability or chronic illness. As with the "Late, Long, Few" policy, marriage is not permitted before certain ages, which vary by location and gender, and second children are generally only allowed after a gap of four to five years. Sometimes this is only allowed if the first child is a girl, clearly acknowledging the traditional preference for boys.

The policy is underpinned by a system of rewards and penalties. The rewards include economic incentives such as payments of cash, low interest loans and preference in schooling. The commonest penalties are very substantial fines, and for those unable to pay, confiscation of belongings. Government employees risk losing their jobs. The Policy is supported by a massive propaganda campaign, stressing the societal benefits and the

personal material benefits of having just one child.

### **The results of the Policy**

The TFR in China has now fallen to around 1.7, so below replacement, although the population is still expected to rise until 2030, because of the baby boom of the 1950s and 60s. On the positive side the Government claims that the Policy has prevented 300 million births (equivalent to the population of the United States) and has helped to lift over 200 million people out of poverty. With women having fewer pregnancies they can acquire skills and training and thus can expect better work opportunities. Abortion is legal and safe with early abortion greatly encouraged, which reduces complications. This is in stark contrast to the situation in many countries where abortion is illegal, and a significant contributor to maternal mortality.

On the negative side the One Child Policy has created a number of problems. First, sex ratios at birth (that is the number of male live births for every 100 female) has risen from 106 in 1979 (which is within normal limits) to an alarming 120 in 2005. However, while the Policy has undoubtedly contributed to this, high sex ratios are not unique to China: India, Taiwan, Singapore, Vietnam, Nepal and South Korea also have high sex ratios, because of the combination of son preference and easy access to sex selective abortion, though they are not as extreme as those seen in parts of China. Second, there is a growing aged-dependency ratio: rapidly falling birth rates leading to growing numbers of elderly people who need to be cared for by the working population. In rural areas where the elderly have no pensions this is a particular concern.

But the proportion of the elderly population above 65 will rise to only 18% by 2025, about the same as most Western countries today. Third, there are problems with unapproved pregnancies, with women prevented from delivering in a health facility if a pregnancy is not approved with potential risk to the health of mother and baby. Fourth, there is very little choice in contraception: there is strong reliance on long term forms of contraception (the intrauterine device initially and later sterilisation).

### **So what are the lessons from the Chinese experience?**

The goal for most countries is to achieve a small family culture where the average preferred number of children per couple is around two. This has occurred in most parts of the developed world with East Asia taking the lead. Hong Kong has the lowest TFR in the world at 0.98; Singapore and Japan also have very low TFRs at 1.2 and 1.38 respectively. Evidence from China suggests that it too has become a small family culture with the preferred number of children for women starting families now at between one and two. So the key question is how best can this be achieved? We know from experience elsewhere that wealth and education are key factors in reducing population growth. China shows that population growth can also be brought about through a combination of easy availability of contraception and a strong determination to reduce fertility rates.

Perhaps the most interesting lesson from China is that the *totally voluntary* "Late, Long, Few" policy of the 1970s brought about the most dramatic falls in fertility. Perhaps there would have been further reductions without the

strict enforcement necessitated under the One Child Policy, though perhaps not to the levels of today.

Even in China the One Child Policy now seems somewhat anachronistic with something along the lines of the "Late, Long, Few" seeming more appropriate. China has changed immensely over the 28 years since the onset of the Policy. Its GNP has seen sustained two-digit growth for two decades; it is now open to the outside world. The people have freedoms only dreamed-of 30 years ago. The Policy is also now more difficult to enforce: more people can afford the fines, and massive rural-urban migration makes it more difficult to track individuals who might want to flout the Policy. But compliance now relies more on the acceptance of the small family culture than any fear of the penalties.

Despite this the Government will not go as far as allowing two children for everyone, which has been recommended by many demographers, and which would be acceptable to the majority of the population. The Chinese response has been to tinker with the Policy allowing for some relaxation. For example, urban couples consisting of two only children, may now have two children themselves.

To summarise there are two main lessons from China for those countries currently experiencing rapid growth:

- A period of high fertility and low mortality will impact on the population growth for decades and therefore should be avoided.
- To reduce population needs strong leadership, excellent access to contraception and a comprehensive public education programme extolling the benefits of limiting family size.

# The Critical Role of Water

*The Earl of Selborne KBE FRS*

Malcolm Potts has reminded us that 99% of the expected increase in global population of approximately 3 billion will take place in developing countries, primarily in the least developed areas. To what extent is a lack of water availability likely to impact on the potential population of 9 billion and with what consequences? Are there water management options which could mitigate such impacts?

I am indebted to Professor Brian Hoskins of Reading University for data on global water use by humans. We use for food, households, industry and energy purposes a mere 0.3% of global precipitation, and 1.5% of precipitation over land. We use 10% of the water flowing to the sea. On the face of it these figures may seem reassuring, and indeed there are many parts of the world where water shortage is not a problem now or likely to be in the future. However, demand for water outstrips supply in a growing number of countries. These shortages occur almost exclusively in developing countries, which are ill equipped to adopt the policy and technology measures needed to address the crisis. The United Nations Environment Programme calculated that in the mid 1990s about 1.7 billion people lived in water stressed countries and that 20% (ie 340 million) lacked access to safe drinking water. By 2030 population growth alone could almost double these numbers, assuming a "business as usual" scenario. As Malcolm Potts told us, a staggering 3 billion people could be short of water.

The International Water Management Institute reports that, globally, water usage has increased six times in the past 100 years.

There is already a physical shortage of water throughout North Africa, South Africa, the Middle East, central Asia and in much of India and China. Much of the rest of Africa suffers from what might be described as an economic water shortage. In other words, the countries do not have the financial resources to make optimal use of the available water. Very little water storage has been provided in sub-Saharan Africa where the irrigated area is only 3.7% of the arable area. Investment in appropriate technology could give much of Africa access to safe and affordable water. It is still common for women in parts of Africa to spend several hours each day walking to and from water sources with containers. A modest investment in a treadle pump can often provide a simple, easily maintained low technology solution to the critical problem of access to safe water.

Where physical rather than economic water scarcity exists it is instructive to note how prosperous economies, such as Singapore and Australia, make up the deficit. Singapore is an island state and has to depend heavily on imported water piped from Malaysia. However, for strategic reasons it seeks to maximise, almost irrespective of cost, its own water supplies. It has invested heavily in desalination, in recycling grey water, that is storm water and dirty water and even proudly advertises bottled drinking water which has been purified to the highest standard from sewage waste. Having no agriculture on the island Singapore imports virtual water in the form of food and drink from other countries. Irrigated agriculture currently uses 70% of the world's developed water supplies, which is the proportion of Australia's water supplies used for irrigation. Like Singapore, Australia is now investing heavily in



desalination plants and water transfer systems at great cost to the federal and state budgets. It would seem much better value to buy up existing irrigation rights for growing rice or watering pasture and to import any food needed to make up the loss, but that does not seem acceptable to the all-important rural vote.

So for those relatively rare regions where economic resources are available but physical water resources are insufficient there are stratagems for the moment at least to provide adequate water at a heavy cost. For most of the regions of physical water scarcity, lower cost solutions must be sought.

As total population moves to around nine billion by 2050, so absolute demand for food will also increase. Increasing urbanisation means people are likely to adopt new diets, particularly those that involve a higher consumption of meat. Changing diets in China will have massive implications for water demand. A kilo of grain requires about a tonne of water, a kilo of beef requires about 15 times that.

Climate change is one of the factors that is contributing to uncertainties about future water supplies. The Hadley Centre's climate model predictions indicate large reductions in river flows across Southern Europe, the Middle East, the Amazon basin and the Danube. Increased flows are predicted in the River Congo, the Yangtze, and the Ganges. The Hadley Centre has reported that its models

were able to reproduce observed changes in drought. The same models project that an additional 30% of global land mass is likely to experience drought by the end of the 21st century under “business as usual” conditions, though the regional details are still very uncertain. Already more than 40 million people regularly need emergency food aid. The predicted increase in drought areas can only increase this figure.

Most climate change models predict that the dry regions will get drier and the wet regions will get wetter. This would lead to increased yields in some northern latitudes, but decreased yields in most of Africa, the Middle East and India.

Johann Rockstrom, a Swedish hydrologist, has calculated that meeting existing and future demands for food, and with the addition of three billion to the world population, will require an extra annual water supply of 5,600 cubic kilometres, or an additional 80% of existing water availability. The International Water Management Institute makes a higher estimate and believes that water usage will double. Even the most optimistic water engineer would acknowledge that supply management, through the provision of additional dams, exploitation of underused resources and water transfer schemes simply cannot deliver on this scale. If sustainability is to be achieved different solutions are needed. Supply management has to be accompanied by demand management.

As agriculture accounts for 70% of the water consumed it is sensible to look first at the opportunities for producing

more food with less water. Typically irrigation systems on extensive cropping systems are 30 to 40% efficient. Most of the water sent down irrigation channels never reaches the plant it is intended for. The demands of that notoriously thirsty crop, cotton, have been responsible for the depletion of the Aral Sea and one of the world's worst environmental disasters. Many other irrigation schemes throughout the world are hopelessly inefficient. Where agricultural systems are based on temporarily flooding the fields to be cropped, most of the water is lost through evaporation.

The Israelis are credited with developing the modern trickle irrigation systems, using black polythene pipes. In Jordan drip irrigation has reduced water use on farms by a third, while raising yields in the past 30 years. Fred Pearce reports in his book *When the rivers run dry* that Israeli farmers have raised water productivity five fold in the same period by using drip irrigation and by recycling urban waste water for crop production.

There is great scope for adopting this irrigation system elsewhere. India drip irrigates less than 1% of its fields. The reason for the slow uptake is cost. To install the full trickle irrigation equipment might originally have required an initial outlay of at least \$500 per hectare. Most farmers who pump the water from beneath their fields get their water at heavily subsidised prices, a tenth of the real cost is typical everywhere from India to California. There is little incentive to save water. There are now some much cheaper trickle irrigation

systems being developed in India and elsewhere which raises the prospect of wider adoption, provided this technology is backed up by more realistic water pricing.

For some countries it might be realistic to move their agricultural production away from the areas of water shortage. The North East of China has many regions of over-exploitation of water and a decline in water availability for agricultural use. The authorities have been trucking in water to millions of people after wells and rivers ran dry in the east of the country. Rather than truck water it may prove more sustainable to move production away from these over-exploited areas.

The Business Council on Sustainable Development published assessments last year of the implications of water shortage made by forecasters from some of the world's leading corporate users of fresh water. The three published scenarios foresaw growing civil unrest, boom and bust economic cycles in Asia and mass migrations to Europe. But they also believed that water scarcity will encourage the development of new water saving technologies and better management of water by business.

I agree. There is much scope for better use of water by agriculturists, by industry and by domestic users. If suitable investment is made in recycling water and in research into low cost, low energy desalination technology, then a population of nine billion could just prove to be sustainable without unacceptable impacts on our environment.

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*In discussion the following points were made:*

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The impacts of HIV and IVF have been negligible in relation to the overall growth of the global population. HIV is currently concentrated in countries with about 3% of the global population. Faith-based views have had variable impacts on population growth, but generally contribute positively. For example, Islam has changed, leading to greater use of natural methods of contraception. Catholicism however has a lot to answer for. For example, from comparable starting points Thailand has moved very rapidly to a smaller family size and a higher living standard compared with the Philippines where poverty is related a large family size. The current situation in Ireland was described as appalling. Greater use of early safe abortion was recommended.

Predictions of population growth beyond 2050 will see further upward momentum. The population growth factor has been a matter for military assessment in order to identify future trouble spots around the globe. Water policy urgently requires governance with unbiased regulation that does not favour urban communities in preference to the countryside. NGOs have a major role to play especially in less populated areas for family planning and in water management, which is the best way to reduce poverty. For example, Rotary International is involved with population issues by educating people, but not telling people what to do. This is more effective than the World Bank buying a billion condoms for which they receive no kudos whatever. People like children, and need information, but not being told what to do.