

An Aging Mankind in a Fragmented and Integrated New World

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Magnifice Rector, excellentissime Decanus, Members of the Senate, ladies and gentlemen! To live to see the day, when your old Alma Mater confers on you its highest distinction, an honorary doctor's degree, is a very exceptional privilege given only to a few in this life and the occasion fills me both with gratefulness and with humbleness.

On a solemn occasion like this, the honorary doctor is expected to look back on his scientific career and sum up his contributions. However, to-day is a very special occasion ; the day when Szent-Györgyi Albert received the Nobel Prize exactly half a century ago. And 30 years ago the same Szent-Györgyi Albert said that there is but one safe way to avoid mistakes ; to do nothing, or at least, to avoid doing something new. In his spirit, I intend to do something new and instead of looking back to my professional life, I will look forward to the great tasks confronting the new generation of scientists here and elsewhere.

In his History of the World, in 1614, Sir Walter Raleigh makes the somewhat acid remark that "It is not Truth, but Opinion that can travel the World without a passport", which immediately gives rise to the classical reflection: what is truth? The Danish Nobel Laureate in physics, Niels Bohr perceived very well the complexity of the proposition, when he spoke about two sorts of truth : trivialities, where opposites are obviously absurd, and profound truths, recognized by the fact that the opposite is also a profound truth, and our times provide many examples of this.

Fifty years ago, as a student of Latin at the Klauzál Gábor reálgimnázium in Szeged I came across the well known quotation : *Tempora mutantur, et nos mutamur in illis* ; times change, and we change with them. Now 50 years later, I feel that we do not change with the same speed as our times. The changes around us are accelerating so rapidly that our perception of these changes is lagging more and more behind. The real danger is that our perception of the consequences of these changes may be affected even more.

It took mankind a long time, perhaps 300,000 years, or more, to reach the first billion ; then growth accelerated and — as you know — we have reached 5 billion this year. All projections of the United Nations (UN) indicate that population growth will continue at a gradually slower rate until it stabilizes at 11 billion sometime around the year 2100. Approximately 90% of this future growth will occur in the developing world.

For the time being, the growth rate is still extremely high in Africa and in the Eastern Mediterranean region, and the population density is by far the highest in South East Asia. (Table 1.)



Year	Billions	
1850	1	
1930	2	
1961	3	
1976	4	
1987	5	
2000	6.15	(4.9)
2025	8.3	(6.9)
2050	9.78	(8.4)
2100	10.87	(9.5)

Table 1. Population growth until the year 1987 and projected populations until 2100. Figures in parentheses stand for developing countries.

During the next 19 years the world population will increase by 1.7 billion; more than half of this increase will take place in 10 countries; in some of them like Nigeria and Ethiopia, the population will double during this time. The effect of this growth on the already very low economic level remains to be seen. (Table 2.)

COUNTRY	POPULATION IN MILLIONS			GNP US\$m
	1986	2006	Increase	
India	775	1036	261	260
China	1074	1320	246	310
Nigeria	99	200	101	730
Indonesia	168	228	60	540
Bangladesh	104	164	60	130
Brazil	138	196	58	1720
Pakistan	104	159	55	380
USSR	281	328	47	n.a.
Ethiopia	38	79	41	110
Mexico	81	121	40	2040

Table 2. Projected population increase between the years 1986 and 2006 and the per capita gross national product in 1984 in 10 selected countries.

What kind of world is then our world to-day? One-third of the households of this world are headed by women and women constitute one-third of the world's labour force. Women are responsible for nearly two-thirds of the total hours worked, receive only 10% of the world's income and own less than 1% of its property. — Another unsolved global problem is unemployment. The International Labour Organization estimates that between 1980 and 2000 employment must be found for 700 million new entrants into the labour force, approximately twice the number of the 1960–1980 period. Moreover, a backlog of unemployed and seriously underemployed workers need jobs. This group constitutes one-third of the existing labour force of 1200 million.

Paradoxically, when expressed in percentage terms, mankind never had such a good life as to-day, but, in absolute numbers, so many never lived in absolute poverty, which traps almost one billion people, 20% of the world population.



Ninety per cent of them live in rural areas ; more than 50% are small farmers and almost 25% are labourers without land.

What can they do? They move to the big cities, and the urban population is increasing dramatically in many developing countries. And since it is the poorest people who move, the population of the slum areas is also dramatically increasing. (Table 3.)

Country	Year	
	1965	1984
Argentina	76	84
Chile	72	83
Colombia	54	57
Hungary	43	55
Libya	29	63
Mexico	55	69
Peru	52	68
Turkey	32	48
Zambia	24	28

Table 3. Increase of urban population as per cent of total in 9 selected countries between 1965 and 1984.

Adequate shelter has been universally recognized as a basic human right; nevertheless, the WHO points out that the overall conditions of shelter and basic services for more than 1 billion of the poor and disadvantaged in developing countries is deteriorating rapidly. Furthermore, some 100 million people have no shelter at all ; they sleep in the streets, under bridges, in vacant lots and doorways.

All UN — projections indicate that urbanization will continue at an increasing rate. In 1974 there were only 28 big cities with a population of 4-million, 15 of them in the developing world. By 2025 there will be 135 such cities and 114 of them will be in developing countries. By 2025, two-thirds of mankind will be city-dwellers.

The UN High Commissioner for Refugees estimates that there are between 10 and 15 million refugees in the world. Their number is increasing at a rate of about 3000 per day ; half of them are children. The top ten countries with the highest number of refugees and their gross national products are shown in (Table 4.) I doubt that comments are necessary.

It may perhaps surprise some of you that the number of physically, mentally, or sensorially disabled persons in the world is between 340 and 480 million : 7—10% of the world population. Some 35% of them live in developing countries. — The state of malnourishment is more difficult to assess, since estimates vary with the definitions and methods of measurement used. However, the WHO thinks that at least 430 million people are affected ; almost 10% of the world population.

At United Nations Conferences some governments are consistently voicing an optimistic view ; they point out that — on the average — fertility has declined, life expectancy increased, caloric intake improved, literacy increased, morbidity diminished and health care improved. Indeed, this is true. However, the opposite is also true.

We are back to the game of percentages and absolute numbers. The percentage of illiterate adults has decreased, but their absolute number increased.

Country	Refugees in thousands	GNP
Pakistan	2,702	380
Iran	2,300	n.a.
Sudan	1,164	360
United States	1,000	15.390
Somalia	700	260
Canada	353	13.280
Zaire	283	140
China	280	310
Burundi	268	220
Tanzania	213	210

Table 4. The top ten countries with the highest number of refugees as of Jan. 1. 1986 and their gross national product (GNP) in 1984. (n.a. — not available).

As you may know this is the UN — decade of safe drinking water and appropriate sanitation and — due to major efforts by the WHO and the World Bank — by the end of the decade, in 1990, there will be an impressive increase in the percentage of adequately covered population.

Due to the above efforts, it is expected that 1.5 billion people will have access to safe drinking water and almost 1 billion to appropriate sanitation. Those still unserved will be 1.2 and 1.8 billion, respectively. These figures do not differ from those reported before the UN — decade. What has happened? The simultaneous population increase has “eaten up” the impressive results. (Table 5.)

Year	Population covered							
	Urban				Rural			
	Water		Sanitation		Water		Sanitation	
Mill.	%	Mill.	%	Mill.	%	Mill.	%	
1970	307	65	269	34	158	13	140	11
1980	509	72	386	54	472	32	206	14
1985	672	77	518	60	581	36	252	16
1990	835	79	652	62	688	41	298	18

Table 5. Drinking water supply: population covered and access to appropriate sanitation in developing countries (both excluding China). Absolute numbers are given in millions (Mill.) and percentages indicate the ratio of population covered.

When it comes to health care, the population per physician dramatically diminished in the world's most populous countries between 1965 and 1981 ; in parenthesis, the USSR and Hungary have the highest number of physicians in relation to their population. At the same time, however, a significant worsening occurred in several developing countries, as indicated on the right. (Table 6.)

Country	Year	
	1965	1981
China	3780	1730
India	4860	2610
USSR	480	260
United States	640	500
Indonesia	31820	11320
Brazil	2180	1200
Japan	970	740
Bangladesh	n.a.	9010
Nigeria	44990	10540
Pakistan	3160	3320
Hungary	630	320
Ethiopia	70190	88120
Malawi	46900	52960
Mozambique	21130	33340
Uganda	11080	22180

Table 6. Population served by one doctor in selected countries in 1960 and 1981. (n.a. — not available).

There has been a dramatic increase in life expectancy at birth around the world during the past 20 years ; it increased by more than 10 years in many developing countries; and the UN projections indicate that by the year 2025, the global life expectancy at birth will be 70 years, instead of 55, which was the case 13 years ago, in 1974. (Table 7.)

Country	Population (millions)	Year	
		1965	1984
China	1030	59	70
India	749	44	55
USSR	275	74	74
United States	237	74	80
Indonesia	159	45	56
Brazil	133	59	67
Japan	120	73	80
Bangladesh	98	44	51
Nigeria	96	43	51
Pakistan	92	44	50

Table 7. Life expectancy at birth in the most populous countries in 1965 and 1984. Population as in 1984.

As a consequence, dependency ratios will also change. To-day there are 91 children and 6 elderly per 100 adults in Africa and 36 children and 16 elderly in Europe. Furthermore, in aging Europe there are 45 elderly people per 100 children, the highest ratio in the world. The UN projects that by 2025 as much as 23% of the

population of the industrialized countries will consist of people aged 60 or above and that in developing countries their number will double from 6 to 12%.

Already to-day, the life expectancy at birth exceeds 60 years in 98 of the 166 member states of the WHO, which corresponds to 62% of the 5 billion living to-day. As late as in 1950, the global population of the elderly was only 200 million; 80 million of them lived in developing countries. By 2025 there will be 1.1 billion elderly and almost 800 million of them in developing countries.

There is a similarly accentuated increase in the number of women approaching the menopause; in 1960, their number was 330 million worldwide; by the year 2000, their number will exceed 700 million. This will have a profound impact on health service requirements. Among the disorders associated with aging and the menopause, the major ones are osteoporosis, cardiovascular diseases, musculoskeletal disorders, cancer and senile dementia.

The best statistics are from the United States, where osteoporosis affects an estimated 24 million people; it afflicts half the women over 45 years and 90% of women over 75 years. It is the underlying cause of 1.3 million bone fractures each year. The annual cost of osteoporosis and osteoporotic fractures in the United States in 1985 was between 7 and 10 billion US dollars.

Of the 1.3 million fractures more than 210,000 are hip fractures; those are associated with more deaths, disability and medical costs than all other osteoporotic fractures combined. Men are also afflicted: among those who reach the age of 90, 32% of women and 17% of men will suffer a hip fracture. Most patients fail to recover normal activity, and mortality within 1 year approaches 20%.

For the time being, the only effective method of prevention in women is the administration of estrogen — which is not without other problems — in combination with calcium and exercise. Many other agents are under study, for instance for providing prevention in men. How many women might be affected by osteoporosis in developing countries is unknown; black and Asian ethnicity appear to reduce the risk. Epidemiological studies in developing countries are urgently needed in order to assess the future needs for health services.

What about cardiovascular diseases? Of the 51 million people who die annually worldwide approximately 25% die of circulatory and degenerative diseases. In the industrialized countries the percentage is more than 50%; in addition, almost 20% die of neoplasms.

Recent reports to the WHO indicate a considerable reduction in death rates from cerebrovascular and ischaemic heart diseases in certain western countries and a disturbing increase in other countries, among others Hungary. The reasons for these opposite trends are incompletely understood (Table 8.)

The same trend can be observed in more than 60 other cardiovascular diseases both in men and women. Because of the overwhelming size of the underlying risk (almost 15 per cent of all women around the world are at risk), in-depth epidemiological studies on the effect of estrogens with or without added progestogens in different populations would be very important. (Table 8.)

Thirty years ago, Szent-Györgyi addressed the issue of the third largest disorder of aging, saying that “Most human suffering, at present, is caused by the so-called ‘degenerative diseases’ — the name standing for ‘diseases we don’t understand and, consequently, can do nothing about’”. He strongly advocated more basic research in this field. Thirty years later the prevalence and pathogenesis of

Country	Period	Cardio-vascular		Cerebro-vascular		Ischaemic heart	
		male	fem.	male	fem.	male	fem.
Japan	1972-82	-36	-42	-51	-51	-22	-34
Australia	1971-81	-32	-39	-39	-44	-33	-36
USA	1970-80	-28	-30	-45	-42	-36	-39
Italy	1970-80	-9	-28	-20	-28	+1	-20
Sweden	1972-82	-2	-20	-21	-24	+5	-19
Yugoslavia	1971-81	+24	+13	+7	-2	+35	+13
Poland	1970-80	+31	+8	+62	+37	+58	+43
Hungary	1972-82	+33	+3	+59	+23	+38	+6

Table 8. Percent changes in death rates for 40-69 year male and female (fem.) age group from cardiovascular (ICD 390-485), cerebrovascular (ICD 430-438) and ischaemic heart diseases (ICD 410-414) during 10-year periods in several industrialized countries. ICD-International Classification of Diseases.

rheumatic and degenerative musculoskeletal disorders and the possible usefulness of estrogen therapy are still the big unknowns.

And the cancer issue? Neoplasms are responsible for at least 5% of all deaths in developing countries and almost 20% in industrialized countries. The most frequent cancer types in men are those of the lung, stomach, colon and rectum, whereas in women the ranking order is breast, cervix and stomach. According to the WHO, there has been an alarming increase in lung and breast cancers among women in 28 industrialized countries during the past 20 years. Smoking is a well-established risk factor lung cancer; concerning risk factors for breast cancer, there still is a great deal of uncertainty (Table 9.).

Carcinoma	Year		Growth (%)
	1960	1980	
Lung	22,000	66,000	200
Breast	44,000	74,000	60
Cervix	23,000	22,000	-5
Stomach	84,000	72,000	-15
Misc.	311,000	442,000	42
Total	514,000	720,000	40

Table 9. Cancer caused mortality of women in 28 industrialized countries.

A few words about senile dementia. Most estimates for the more severe degrees of dementia among those aged 65 and over are between 5 and 8% and the lifetime cumulative risk of becoming severely demented by the age of 80 years has been calculated to be between 15 and 20%. In the United States, more than half the total of over 1 million persons living in geriatric institutions suffer from mental impairment and a high proportion of them require either maximum or intermediate grade nursing care.

Field studies in Western Europe indicate that institutional cases make up less than 10% of the total prevalence of psychiatric disorders in people aged 65 and above and that even in cases of psychoses and severe dementia less than 20% are in institutional care at any give time.

According to demographic projections, the total number of affected persons will increase over the next 50 years by about 50% in the industrialized countries and will more than double in the developing countries. Furthermore, the population over 80 years of age, which suffers the highest frequency of demential disorders, will double in size by the end of this century and the WHO fears that the burden placed by the patients on their families and on the health and social services may be greater than they can bear.

Is then the future hopeless? Absolutely not! However, entirely new approaches and an intelligent collaboration with the inevitable will be required. The UN Conference on Aging expects that, as men and women live to increasingly higher ages, major disabilities will largely be compressed into a narrow range just prior to death. However, to achieve this, it is inevitable to spend much more on health services and on medical research. Only one-third of the 166 member states of the WHO spend to-day more than 5% of their GNP on health : figures of this magnitude will be grossly inadequate to cope with the health problems of a rapidly changing world.

Hence, it will be inevitable to rearrange the national priorities and spend on arms and armaments much less and on health services much more. There is simply no viable long-term alternative, and developing countries will soon realize this. (Table 10.)

Expenses spent on	Developed Countries		Developing Countries	
	1970	1978	1970	1978
Arms and Armament	312	345	70	102
Health and Medical Services	126	213	13	22

Source: UNEP, 1984

Table 10. Expenses spent on armament and health services (USD M).

For the same reason, it became easy to answer the question posed by Adlai Stevenson at the UN General Assembly 25 years ago : ‘Will Man ever recognize that his need for his fellow men far outweigh his arguments with them?’ Yes, he will. There is simply no long-term alternative. And we have to keep in mind, that our lifetime represents the first age since the dawn of civilisation in which people have dared to think it practicable to make the benefits of civilisation available to the entire human race, and what happens to-day in terms of industrialized country assistance to developing countries is just the very beginning of a process, which is — again — inevitable.

Am I a naive optimist? A dreamer? Certainly not. I am only consistent. Looking back on history, Leshner and Howick say that ‘Eight hundred life spans can bridge more than, 50,000 years. But of these 800 people, 650 spent their lives in caves or worse ; only the last 70 had any truly effective means of communicating with one another, only the last 6 ever saw a printed word, or had any real means of

measuring heat or cold. Only the last 4 could measure time with any precision ; only the last 2 used an electric motor ; and the vast majority of the items that make up our material world were developed within the life-span of the eighthundredth person, our own generation.' All of us could add something significant to this list, be it the airplane, radio, television, the conquest of space, chemotherapy of various cancers, bacterial and viral diseases and the eradication of many infectious diseases. Most drugs we use to-day have been developed within our lifetime. Thus science has radically changed our world; it will change even more the world of next generations and will improve the human condition on Earth. The process is inevitable; hence there is plenty of hope for the future.

Ladies and gentlemen, in the final analysis, hope is the quintessence of the human condition, and I believe that each of us has many opportunities in this life to generate new hope. I also believe that the collection, systematisation and dissemination of scientific information and the generation of fresh hope are crucial steps toward improving the human condition to-day and to-morrow. This will also be the task confronting you, the new generation of scientists. And in your future endeavour, please do not forget that medical research is also an essential ingredient of our culture. Therefore remember the words of Kodály Zoltán: Culture cannot be inherited. The culture of one's forefathers evaporates in a trice if each generation does not acquire it over and over again for itself." — I am convinced, that the Albert Szent-Györgyi Medical University will successfully maintain the cultural treasures of Hungary and further develop them in the centuries to come.