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Fifty Years Of Primary Health Care: The Kerala Experience

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During the last fifty years, Kerala State, home to the Malayalam speaking people, has made significant gains in all domains of health. Most indices of health used for international comparisons come close to those of industrially developed, high-income countries. These achievements have been registered against the backdrop of low income, high population density and very high levels of unemployment among the educated. However, high levels of female literacy that stand close to 90 per cent, rapid gains in the sanitation front and an extensive network of modern medical care institutions, both in rural and urban areas have served as push factors in accelerating health development. Figure 1 summarizes the dramatic gains in health indicators that Kerala achieved between 1956 and now.

The unique feature of development of Kerala is the narrow differences that exist between rural and urban areas. Visitors to Kerala characterise the whole State as "rur-ban" continuum. It is difficult to guess as to where a town ends and a village begins. The external symbols of prosperity reflect an improved lifestyle that ensures safe water, access to toilets, better telecommunication facilities, improved roads and quick access to other amenities like schools, colleges, and hospitals. The narrow, rural – urban differences that we perceive in Kerala are also demonstrated when the indices are compared among the 14 districts of the state. As Table 1 reveals, all the indices vary within a small range: even the district with the poorest indicator fares much better than the Indian average.

Health care in Kerala

During the last fifty years, the health infrastructure of the state has shown significant growth in terms of manpower, beds and institutions. In 1960, there were only about 1200 registered doctors under modern medicine; the number currently stands over 36,000. About 8,000 doctors are presumed to be working outside the state; another 2000 doctors of Kerala registration are believed to be working in different Indian states. On the assumption that we have over 25,000 modern medicine practitioners currently serving Kerala, the ratio works up to one doctor for 1250 people. Allied systems of health care contribute another large manpower pool, though their contribution to institutionalised care is only marginal. When primary health centre (PHC) is considered, we see that the number of primary health centers has increased from 369 in 1960 to 1356 in 2004. The provision of PHC facilities has far outstripped the increase in population, which rose only by a factor of two.

A major development in Kerala's health scene is the virtual domination of the private sector. Though information on infrastructure in the private sector is far from complete, more than 70 per cent of beds, institutions are in private sector; over 70 per cent of professionals serve in the private sector. Private hospitals dominate tertiary care sector, both in terms of manpower and interventional facilities.

Even deliveries, which used to take

place almost exclusively in government hospitals, are increasingly occurring in the private sector. The Directorate of Health Services no longer influences health outcomes nor does it play an effective watchdog role. Health care has been turned into a commodity transaction and is increasingly dictated by monetary considerations. Doctors and hospitals are frequent targets of attack from the public and media. The momentum that was created in the sixties and ably sustained in the seventies and eighties of the last century has gone and Kerala no longer stands first in certain indices of PHC.

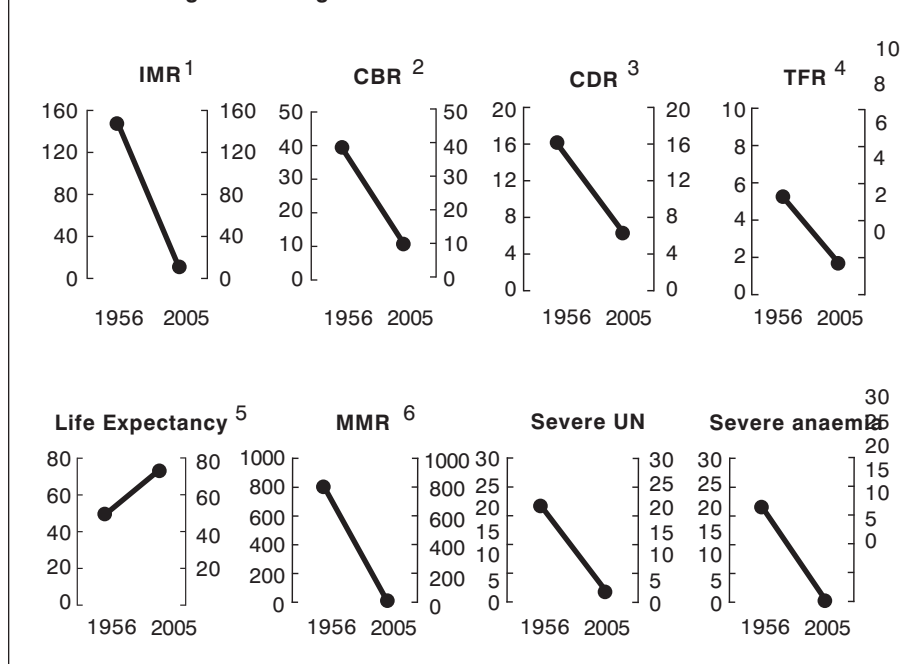
Emergence of non-communicable diseases

It is well known that populations in developing countries are experiencing both demographic and health transitions. Kerala has almost completed its fertility transition. No data, however, are available on the nature and profile of the transition in health in Kerala. Health action by people (HAP) has been gathering birth and death information in a large rural community, for the past many years. Cause of death was determined by relying on medical records and wherever needed, questioning the close relatives of the deceased.

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Figure 1: Changes in selected health indicators: 1956-2005



Source: 1-6 (SRS)

Table 1: Selected health indicators in different districts of Kerala - 2005

District	Complete ANC	Institutional delivery	Complete immunization	% low birth weight	IMR
Trivandrum	72	99.5	81.6	11	12
Kollam	90	99.0	90.6	12	8
Pathanamthitta	85	99.4	91.4	18	8
Alappuzha	93	100.0	97.4	12	8
Kottayam	92	99.4	79.1	16	14
Idukky	82	93.3	90.8	15	20
Ernakulam	90	99.4	93.4	18	12
Thrissur	89	99.2	90.5	13	9
Palakkad	86	93.4	75.1	16	12
Malappuram	79	88.0	59.8	17	10
Kozhikode	93	98.9	90.9	17	14
Vayanad	90	97.8	82.3	30	22
Kannur	90	99.4	84.7	15	14
Kasargode	75	96.7	87.4	15	10

Source: Human development report Kerala 2005 (Govt. Kerala)

Investigators had the help of a verbal autopsy instrument. They were given adequate training in its administration. A registry of deaths and births is being maintained. Data for three years was collated and analysed. Figure 2 summarises the relative contributions of the principal during the years 2001-

2003 in our study population.

Different causes were grouped under eight major classes and compared the results with that of the USA (Table 2).

There is a striking similarity between USA and rural Kerala in the

burden of deaths from circulatory and degenerative diseases (47 per cent vs 50 per cent). Also, similar is the contribution of infectious diseases, which remain quite low at or below 5 per cent of all deaths. The most striking difference is in cancer mortality. Though there is evidence that cancer incidence is increasing in India, currently, the burden remains low in rural Kerala.

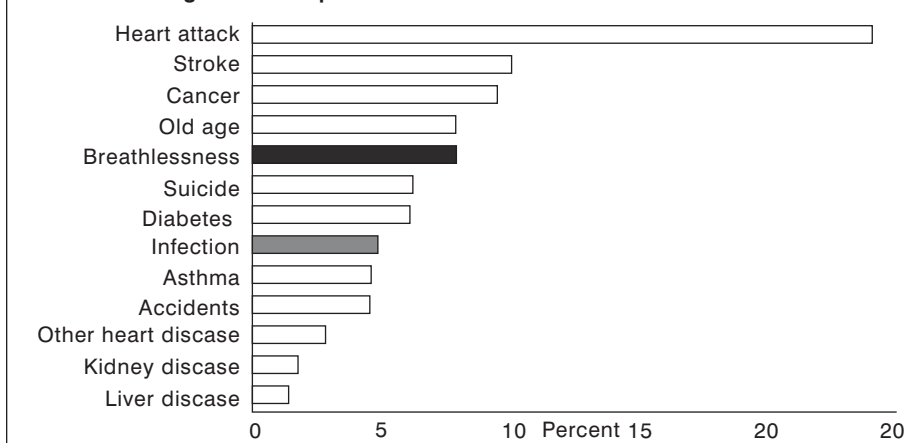
Table 3 summarizes pertinent data on age-standardized death rate from selected causes in rural Kerala and a few developed countries; Data from Kerala confirmed the popular perception that heart attacks are on the increase.

Only Scotland, among the countries chosen has higher cardiovascular mortality than rural Kerala. Ischemic heart disease (IHD) mortality in Kerala is nearly three times higher than that in France! Even the United States fare better than Kerala in IHD mortality. The differences in stroke mortality are not as striking. A matter of great concern is the poor state of mental health of people, reflected by an alarmingly high suicide rate. The suicide rate among women in Kerala is higher than that reported from other countries.

Death rates were calculated on the basis of socio-economic class. The differences in death rates from heart attacks are quite small between the four social classes (Table 4). Though, the lowest socioeconomic class had a slightly higher mortality rate, this was not statistically significant. However, the lowest socioeconomic classes had much higher mortality from suicides, strokes and infections, totally on expected lines.

An attempt was made to estimate the burden of coronary heart disease using the data on death. According to the data, the number of annual deaths from heart attacks in Kerala would be in the range of 45000-52000. The report on vital statistics for Kerala estimated that there were over 49,000 deaths from heart attacks in Kerala during the year 2004. In India, the reported mortality after a heart attack is around 25 per cent. On that assumption, it is estimated that every year in Kerala, over 180,000 persons suffer heart attack. The median age of first heart attack in men in India is estimated as 51 years and Kerala is no exception.

Figure 2: Principal causes of death in rural Kerala 2003-2005



Source: Ongoing studies (Dr C.R. Soman);

Table 2: Profile of cause of death in Rural Kerala and United States of America

Condition	Kerala rural	USA*
Infections and parasitic diseases	05.0	4.5
Neoplasm	10.2	23.6
Circulatory & Degenerative disease	47.0	50.7
Complications of pregnancy	0.0	0
Perinatal conditions	0.6	0.5
Injury & poisoning	11.1	6.3
Ill defined causes including old age	11.4	2.2
Chronic obstructive lung disease	6.7	3.7
All other	8.6	7.3

Source: On going studies (Dr C.R. Soman); Country statistics from World Health Statistics Annual 1997-99 (online ed.), WHO *Data pertains to year 1995

Table 3: Age standardized death rate from selected causes- rural Kerala and selected countries

	All cause	CVS	IHD	CVA	Suicides	Cancer	
Netherlands	Total	551.5	194.6	81.0	44.5	8.7	159.2
	Male	725.4	260.0	118.9	49.6	11.9	213.9
	Female	429.0	146.4	52.9	40.5	5.6	124.0
USA	Total	577.7	215.8	106.5	34.8	10.5	143.4
	Male	722.5	270.8	143.5	37.0	17.5	175.6
	Female	462.8	172.2	77.9	32.8	4.0	121.1
Scotland	Total	660.8	268.5	150.4	67.8	11.0	173.8
	Male	829.0	341.1	209.5	73.6	16.9	214.3
	Female	535.2	212.9	105.9	63.0	5.2	148.4
France	Total	489.3	134.4	39.8	33.1	16	147.2
	Male	671.7	178.5	60.4	39.9	24.5	213.4
	Female	345.2	100.8	23.9	27.9	8.3	96.8
Varkala (Kerala)	Total	620.9	226.3	135.3	31.62	31.65	35.05
	Male	748.4	296.8	212.0	27.4	41.18	37.6
	Female	498.1	157.7	61.3	35.7	22.47	32.6

Source: Country statistics from World Health Statistics Annual 1997-99 (online ed.), WHO

Prevalence of Type 2 diabetes and cardiovascular risk factors in rural and urban Kerala

Currently, health action by people has undertaken a cross-sectional study on the prevalence of Type 2 diabetes and a few cardiovascular risk factors in

selected rural and urban communities. The rural community studied forms part of the population under long-term surveillance. The urban communities were selected from Trivandrum city and represented residents of housing colonies. The profile of the study population is given in Table 5.

In every age group, there were more women than men. It was expected since participation in the study necessitated the presence of the subject for the whole forenoon. Many men could not afford to forego a day's wages for the study. However, even among men the response rate was only just under 70 per cent. All study subjects were administered a questionnaire regarding personal and family details. Self reported diabetes was recorded and all non-diabetic subjects were administered oral glucose tolerance test, using 75 grams glucose.

Diagnosis of diabetes was made on the basis of internationally accepted criteria. The data relating to the prevalence of type2 diabetes in rural and urban areas is presented in Table 6.

The picture that emerges is quite disturbing. The expected rural urban difference does not exist in Kerala. The prevalence, even in rural areas of Kerala, is similar to or higher than that reported from urban India.

The prevalence of diabetes among men reaches peak at 36 per cent when they are 50 and continues to remain at that level during remaining decades. At every age, more men have diabetes. In women, the prevalence of diabetes increases steadily with increase age. The gap in diabetes prevalence between the sexes narrows with increasing age but persists even in the eighth decade. On the basis of the observed prevalence, an attempt was made to estimate the current burden of diabetes in Kerala. The age-standardized prevalence (for Kerala's age structure) works out to 14.9 per cent in men and 13.2 per cent in women. In absolute terms, it translates to approximately 16 million males and 14 million women suffering type2 diabetes. The term - "diabetes capital of India" suits Kerala. The social, economic and development costs of the burden of diabetes has not been appreciated by the government or the health community. Added to the burden of diabetes is the high prevalence of impaired glucose regulation- the combination of isolated impaired fasting glucose (IIFG), isolated impaired glucose tolerance (IIGT), or a combination of both. Our estimates reveal that the prevalence of impaired glucose regulation (IGR) is about 70 per cent of the prevalence of type2 diabetes mellitus in Kerala. If factor IGR also

SESclass	Heart attack	Stroke	Cancer	Suicide	Accidents	Infection	Allcause
1	116.6	57.6	50.7	43.9	21.9	30.2	521.3
2	123.4	51.2	48.3	33.1	26.8	25.6	511.6
3	123.5	51.4	44.3	27.5	22.7	23.5	486.2
4	111.2	38.4	56.2	30.2	17.8	17.8	480.7

Source: Population registry for lifestyle diseases-ongoing studies

considered into calculations, Kerala has at least 51 million people with impaired glucose metabolism.

Prevalence of hypertension

All subjects recruited for the survey of type2 diabetes had their blood pressure measured with an advanced electronic digital blood pressure unit. Two measurements were made, with the subject in the sitting posture, relaxed and with right arm resting on a table; the average of two readings taken at four-minute intervals was recorded. Prevalence of hypertension was calculated as the sum of those who already were diagnosed by a physician to have hypertension and those in whom resting blood pressure exceeded 139/89 mm of Hg (either or both). The age related prevalence of hypertension is given in Table 7.

The prevalence of hypertension is higher than that of type2 diabetes, both in men and women at every age. Unlike in type2 diabetes, after the age of fifty more women have hypertension. As expected, the prevalence of hypertension is much higher in diabetic than in the non-diabetic

population. The proportion of persons with doctor-diagnosed hypertension is much less than that of previously diagnosed diabetes. The high burden of cardiovascular deaths in Kerala is best understood against the backdrop of high prevalence of diabetes and hypertension, and other risk factors that are presented in Table 8.

The data in Table 8 show that overweight and obesity have already emerged as significant health problems in Kerala. The data for BMI is quite consistent with the prevalence information on diabetes and hypertension. Even when we use the cut-off level- of 25 for estimating overweight; nearly 50 per cent of rural women are overweight. The prevalence was slightly less among urban women - 42 per cent vs. 48.3 per cent. Significantly, fewer men suffer from overweight, a feature quite consistent with previous reports. Naturally, the proportion of high-risk individuals increases substantially, if we reduce the BMI cut-off to 23, a more sensible estimate for calculating risk in our population.

Nearly 70 per cent of adults in the age group 30-70 years have serum

cholesterol above 200 mg/dl. If we use the cut-off level of 239 mg/dl, more than 30 per cent subjects are at high-risk. The high prevalence of hypertension has already been discussed. The proportion of subjects with elevated triglycerides is much less than those with high serum cholesterol. However, the prevalence of hypertriglyceridemia is higher among urban residents. Smoking is an exclusive male habit in Kerala. Nearly 37 per cent of males in rural Kerala are smokers, while the proportion is a little lower, at 31 per cent in the urban areas.

Saturated fat intake in Kerala – our observations

Dietary intake of nearly 2000 persons both in rural and urban areas to estimate the contribution of fat energy- particularly from saturated fats to the overall energy intake in Kerala (Table 9).

At every level of energy consumption, fat contributes at least 30 per cent of total energy. Seventy percent of the fat energy is derived from saturated fat at every level of energy consumption. The same pattern is seen in rural men, urban men and urban women respectively. The comparison with recommended level is shown in Figure 3. It is probable that the distorted profile of dietary fat, loaded heavily in favour of saturated fats, almost exclusively provided by fresh coconuts and coconut oil (less important) is the principal reason for the observed hypercholesterolemia.

Mean serum cholesterol in Kerala population (both rural and urban subjects) exceeds 230 mg/dl, and is much

Age (years)	Rural		Urban	
	Male	Female	Male	Female
20-29	15	37	69	165
30-39	97	323	181	386
40-49	205	487	294	417
50-59	239	347	248	342
60-69	189	262	162	190
70+	43	62	57	69
Total	788	1518	1011	1569

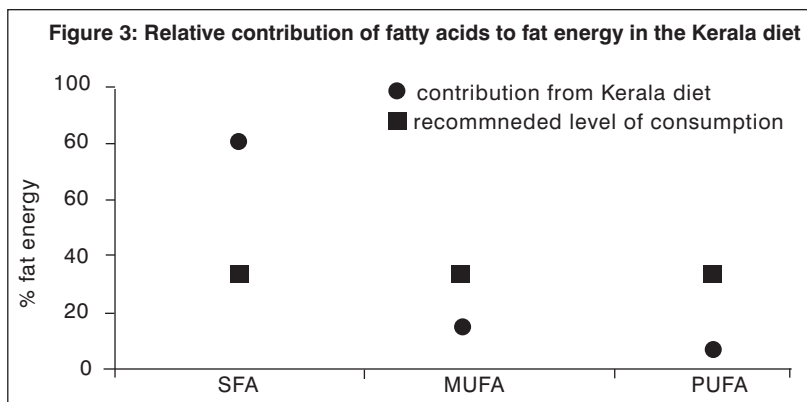
Source: Prospective rural & urban epidemiology study ongoing

Age (years)	Rural		Urban	
	Male	Female	Male	Female
20-29	6.7	5.4	0	1.2
30-39	10.3	7.1	8.3	8
40-49	21.9	14.4	25.2	17.3
50-59	31	22.2	32.7	30.4
60-69	28.6	37.8	40.7	27.9
70+	19	31.7	43.1	38.5

Source: Prospective rural & urban epidemiology study ongoing

Age (years)	Male	Female
20-29	5.5	4.8
30-39	21.5	15.5
40-49	32.8	30.8
50-59	49.7	53.5
60-69	59.8	64.1
70-79	59.2	80.9
Total	41.4	38.1

Source: Ongoing studies (Dr C.R. Soman);



Source: Ongoing studies (Dr C.R. Soman); (Based on 2635 diet surveys)

Risk factor/disease	Rural		Urban	
	Male	Female	Male	Female
BMI \geq 25	33.6	48.3	32.1	42.9
BMI \geq 23	55.0	58.8	52.7	63.3
S. Cholesterol \geq 200	68.9	73.8	68	73.7
S. Cholesterol \geq 240	31.9	38.2	31	36.7
Blood pressure \geq 140/90	44.4	42.4	37.7	36.7
Triglyceride \geq 150	21.6	11.7	37.1	21.6

Source: Ongoing studies (Dr C.R. Soman);

Energy centile	Total	SFA	MUFA	PUFA
10	30.13	21.7	5.12	1.12
50	31.64	23.2	4.04	1.62
90	35.12	25.7	5.16	2.02
Mean	32.28	23.5	4.56	1.77

Source: Ongoing studies (Dr C.R. Soman);

higher than reported levels from rest of India.

Conclusion

The dramatic decline in mortality and fertility that Kerala witnessed in second half of the 20th century has created new problems for the state. The proportion of aged people exceeds 10 per cent of the population. Rapid changes in lifestyle have contributed to an alarming increase in non-communicable diseases. The prevalence of Type2 diabetes, hypertension, over weight and obesity and cardiovascular diseases has assumed alarming proportions. The state of Kerala has not yet taken note of the magnitude or developmental consequences of the burden of non-communicable diseases.

Fortunately, interventions needed for controlling these are not expensive, high technology interventions. Simple dietary and lifestyle interventions like exercise, increased consumption of fruits and vegetables and abstinence from tobacco and alcohol can make a substantial dent in the problem of non-communicable diseases in Kerala.

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References

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2. Government of Kerala. Human development report, Kerala, 2005.
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FOUNDATION NEWS

● Symposia

NFI organized a two-day symposium on "Nutrition and Bone Health" on July 31st and August 1st, 2007 at India International Centre, New Delhi. Several outstanding speakers from India and abroad attended the Symposium, which was inaugurated by Dr R K Srivastava (Director-General Health Services, Government of India). The Proceedings of the Symposium will be printed as a supplement of Indian Journal of Medical Research in the near future.

C Ramachandran Memorial Lecture

On the occasion of its Annual Foundation Day, Dr V Prakash – Director CFTRI, Mysore will deliver the C Ramachandran Memorial Lecture at NFI on November 29th, 2007. Following on this a two-day symposium on "Food Technology for Better Nutrition" will be held on November 30th and December 1st, 2007 at India International Centre, New Delhi.

● Study Circle Lecture

"Neonatal and Child Mortality in India: Regional Differences and Time Trends" by Dr Prema Ramachandran, (Director - Nutrition Foundation of India) on 28th September 2007.

● Proceedings

The Proceedings of the Symposium on "Primary Health Care – New Initiatives" held on November 30th and December 1st, 2006 has been published. It is also available on the NFI website: www.nutritionfoundationofindia.res.in