Improving Public Health in India:
Need for Innovative Solutions in Health Care Delivery

Report of the deliberations at Hyderabad, India
December 19-20, 2006
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Background and Objectives</td>
<td>02</td>
</tr>
<tr>
<td>2. Meeting Public Health Commitments: Role of Innovative Solutions</td>
<td>04</td>
</tr>
<tr>
<td>4. Improving Rural Health in India</td>
<td>29</td>
</tr>
<tr>
<td>5. Emerging Health Care Challenges</td>
<td>35</td>
</tr>
<tr>
<td>6. Addressing the Challenge of Diabetes Mellitus in India</td>
<td>40</td>
</tr>
<tr>
<td>7. Addressing the Challenge of Diabetes Mellitus in India-</td>
<td>45</td>
</tr>
<tr>
<td>Managing Systemic Manifestations</td>
<td></td>
</tr>
<tr>
<td>8. Financing Healthcare Delivery</td>
<td>50</td>
</tr>
<tr>
<td>9. The ICICI Centre for Technologies in Public Health</td>
<td>56</td>
</tr>
<tr>
<td>Annex: Conference Program</td>
<td>58</td>
</tr>
</tbody>
</table>
1. Background and Objectives of the Conference

Poor people usually have the worst health outcomes and people are pushed further into poverty due to ill health. Health services fail poor people because health systems are often caught in a web of failed accountability. At the current pace, most countries will not reach the Millennium Development Goals for Health by 2015. Halfway through the interval for achieving MDGs, the score is mixed; for example, the poorest 20 percent of the population within countries have seen improvements in nutrition, but child mortality has been falling more slowly among the poor than among the better-off. In addition to this challenge, developing countries also face the rapidly increasing burden of lifestyle-related diseases across populations. Interestingly poor groups have high rates of malnourishment, obesity and diabetes and are no longer excluded from the epidemiological transition.

Several factors besides the availability and quality of care affect health outcomes among poor. The availability of services often varies inversely with need. Health financing solutions for the poor often range from a difficult-to-sustain completely free package to health insurance schemes that are not necessarily sensitive or flexible enough for the rural psyche. The reality of easily accessible quality health care in rural India remains a myth for many parts even after 59 years of independence. Responsiveness to patient needs is better in the private sector but the technical quality of services may vary from the excellent to the very poor and is compounded by a lack of regulatory mechanisms. Gaps exist in several areas of health care. Some of the most important gaps include an understanding of the burden of disease and what leads or causes ill health, the availability and use of appropriate technology in the management of diseases and ill health, and health systems that impact upon service delivery.

Relatively little attention has been paid, by either the private or the public sector, to technology applications that could improve the capacity of communities to carry out non-clinical or population-based functions of public health. On the public heath front, thus far, the efforts of central or state governments have been mostly related to computerization of hospitals for the delivery of medical care to individuals.
Whether countries can scale up health interventions by 2015 to meet the MDGs depends only in part on sound governmental policies and expanded funding. We believe that there is also a role for developing innovative solutions which make healthcare more accessible and affordable. We believe technology solutions integrated with existing health systems have an important role to play in the process of health care delivery.

ICICI Knowledge Park and the ICICI Centre for Technologies in Public Health organised the third International Knowledge Millennium Conference, IKMC2006, 'Improving Public Health in India: Need for Innovative Solutions in Healthcare Delivery' on December 19 & 20, 2006 at Hyderabad, India. The major objective of this conference was to learn from the deliberations of subject experts on several themes of importance to Public Health in India, prior to determining the focus of the proposed ICICI Centre for Technologies in Public Health at Hyderabad, India.
2. Meeting Public Health Commitments: Role of Innovative Solutions

Key Note Address: Dr. Gerald T Keusch and Dr. R Balasubramaniam
Panel: Mr. N Vaghul and Dr. Nachiket Mor

Poverty assumes different dimensions across the world and has a global impact. The International Community came together to develop and implement an agreement – the Millennium Development Goals- that focused on development of the global community through strategies focused on poverty alleviation. It was hoped that the MDG will be achieved by 2015.

The Eight Millennium Development Goals

1. Eradicate extreme poverty and hunger
   Halve the proportion of people living on less than one dollar per day
   Halve the proportion of people who suffer from hunger

2. Achieve Universal Primary Education
   Ensure that boys and girls alike complete primary schooling

3. Promote gender equality and empower women
   Eliminate gender disparity at all levels of education

4. Reduce child mortality
   Reduce by two-thirds the under-five mortality rate

5. Improve maternal health
   Reduce by three-quarters the maternal mortality rate

6. Combat HIV/AIDS, Malaria and other diseases
   Reverse the spread of HIV/AIDS

7. Ensure environmental sustainability
   Integrate sustainable development into country policies and reverse loss of environmental resources
   Halve the proportion of people without access to potable water
   Significantly improve the lives of at least 100 million slum dwellers

8. Develop a global partnership for development
   Raise official development assistance
   Expand market access
There are several interesting aspects to the eight MDGs.

a) Five of the eight goals and one of the two prongs of the strategy for development concern health and education.

b) Success in reaching these goals had to be based on system wide reforms to support progress.

c) The focus on health and education outcomes did not imply- either implicitly or explicitly- that other factors were not important. Health and education are interlinked with social dynamics, accessibility, availability and affordability of infrastructure and trained human resources, and the availability and utilization of technology to produce favourable outcomes.

d) The spirit of the MDG- time bound, outcome based targets- does not die by achieving these goals.

Worldwide, Governments are committed to the principle and targets of the MDG. Whether countries can scale up health interventions by 2015 to meet the MDGs and the increasing pressure of life style diseases, depend only in part on sound governmental policies and expanded funding. Halfway through the interval for achieving MDGs, the score is mixed; for example, the poorest 20 percent of the population within countries have seen improvements in nutrition, but child mortality has been falling more slowly among the poor than among the better–off. In addition to this challenge, developing countries also face the rapidly increasing burden of life style related diseases across populations. Clearly, there is a need for improvised or innovative solutions.

Mr. Vaghul welcomed the gathering and stated that the time has come to move from words to decisive and replicable action. Dr. Mor, in his welcome address, stated that the theme of this conference is of interest to the wider community of India. Dr. Mor presented a brief overview of the role of different institutions under the purview of the ICICI Group. The evolution of ICICI Knowledge Park (IKP) from an initiative focused on promoting business driven research in life sciences in India to its current status of being unable to meet the demand for services was presented briefly. IKP was set up in collaboration with the Government of Andhra Pradesh. IKP is now expanding to relate life science and technology focused on issues of the rural or
disadvantaged populations of India. A fund to support innovation, venture capital, efforts in agriculture, modern developments (global) translated to the ground (translation center) are part of the overall scheme for development. The ICICI Centre for Child Health and Nutrition at Pune, India focuses on generating basic answers to the problems encountered by children, develop ideas that can be embedded in the larger government health systems, the scientific know how to influence public policy, and issues relating to nutrition. This initiative evolved from the ICICI SIG that has been functional for the past six years. The ICICI Centre of Technologies in Public health (ICTPH) will focus on issues surrounding health care delivery, to an extent on preventive work, challenges of delivering health care particularly to rural India, and appropriately integrating technology within existing health systems.

The conference heard on the current status of reaching the MDG from Dr. Gerald Keusch from Boston, USA, who presented a broad global perspective and Dr. R. Balasubramaniam from Mysore, India, who presented a national perspective.

Health is a key driver of development. The National Rural Health Mission of the Government of India is an example of an initiative aimed at achieving the MDGs. The National Rural Health Mission of India seeks to provide effective health care to the rural population, especially the disadvantaged groups including women and children, by improving access, enabling community ownership and demand for services, strengthening public health systems for efficient service delivery, enhancing equity and accountability and promoting decentralization.

Innovation in public health needs a constant flow of information. There is potential to improve upon technology for information generation, for analysis of collected information and to use it appropriately. Information in public health is to a large extent present in the health care, surveillance and research domains. The information present in different domains needs to be collected and synthesized appropriately for optimal benefits. Progress in public health is essentially achieved through new knowledge or new means to use existing knowledge. A commitment of resources to research and national and appropriate international and intersectoral collaborations is essential along with mechanisms to strike a balance between exploration of new
ideas and the possibility of failure to demonstrate anything new. There has to be demonstrable outcomes from research (even if it is a negative outcome) like new drugs, vaccines, diagnostics, devices, and strategies for their effective use. Ultimately, political will, stewardship, public accountability and outcomes driven policies are necessary to drive the process forwards.

Public health has to shift focus from disease prevention to health promotion. There are, of course, several challenges including social and economic inequalities to access, stratification of society by different criteria including race, ethnicity, gender, religion, the possibility that political power is not always exercised focusing on public health and the differing environments and biological ecology among member states of the world.

There are several other challenges as member states strive to improve public health equitably.

A) Diseases are now assuming complex multi factorial patterns
B) There is an epidemiological transition of diseases from the unfinished agenda of communicable diseases to the more complex non communicable diseases
C) The epidemiological transition is increasingly prevalent even among resource poor populations

Achieving equity is not as easy as it sounds - “A reality too often overlooked in the search for equity is that problems only of the poor...are no longer the only problems of the poor…” (Julio Frenk: Bridging the divide: global lessons from evidence-based health policy in Mexico. Lancet 368: 954, 2006)

Several innovations for information collection and dissemination are possible

- Electronic reporting – track disease patterns, risk factors, access to care, pharmacy, outcome
- Rapid, sensitive, reliable diagnostic tools
- Remote sensing – integration with ground level data
• Personal data storage – secure, private, portable accessible, usable, personal medical records
• Telemedicine to less accessible areas
• Mobile phones to communicate among providers, assist adherence, transfer lab data with feedback, manage drugs, and provide patient support – Cellimedicine

However, innovations require commitment at different levels- a commitment to act, to equity, of resources, to innovation and accountability.

The Key Question is: How do you make the challenge of health systems attractive to the young innovators and care providers? What rewards or incentives will attract or retain them?

The potential benefit of a public health surveillance system was discussed using emerging infectious diseases as an illustrative example. Over the last thirty years at least 30 new infectious diseases have emerged. These encompass infections of plants, animals, and human beings. Bioterrorism is a concern but so is the need for rapid detection and characterization. For some of these emerging infections, it was months before an agent was isolated and thus timely and sensitive public health surveillance and response was to a great degree syndromic. The questions asked of a surveillance system differ based on the agent and the scenario to be detected. Tracking infrequent and not highly unique human syndromes across a large general human population (as in the West Nile Virus outbreak) may not be most effective to achieve the rapid recognition envisioned in the new International Health Regulations. A system of systems that includes animals that manifest aberrations earlier in time would be preferable to waiting until larger numbers of people develop encephalitis and land in intensive care units.

The need for national and international coordination was emphasized. It was reiterated that national solutions are needed to solve national problems and that nations or organizations could act alone sometimes but not always. Global solutions are needed for global problems and it is almost impossible to act alone to solve
global problems. The most important consideration for innovation is a clear understanding of what the system is trying to accomplish.

The Internet voluntary reporting and the Global Public Health Intelligence Network are examples of innovations. Syndromic surveillance systems and the data sources including automated and voluntary data sources, and software technologies including software integrated with cell phones are other examples of innovations.

The position of a public health surveillance system within the public health sector can be understood better keeping the conceptual framework provided by P. Kelley in IOM, 2006 as the background “a group of integrated and quality-assured, cost-effective, and legally, ethically and professionally acceptable processes, to identify in an ongoing, flexible, standardized, timely, simple, sensitive, and predictive manner the emergence of meaningful epidemiologic phenomena and their specific associations. These processes include human, laboratory, and informatics activities to skilfully manage information derived from an entire defined community (or a subgroup sufficiently representative and large) and to disseminate that information in a timely and useful manner to those able to implement appropriate public health interventions.”

Different epidemiologic scenarios will affect populations in different ways. Key though is that if one wants to detect any epidemiologic scenario, the population under surveillance should include the one likely exposed. If demographic misclassification affects the description with respect to person, place, and time, associations may be missed. Sometimes surveillance populations are chosen as a matter of convenience. At risk populations need precise definition.

The future is looking towards new exciting developments in the form of a host of new “omics”, which indicates the study of complete groupings or systems of biomolecules, such as a genome, containing all of an organism's genes, its proteome, containing all of its proteins, etc. We need to look at systems biology that integrates information from these fields of study to obtain a more complete and complex understanding of cell function through the use of biomathematics, pattern
recognition and computer based algorithms to relate and connect information. By connecting systems biology with biomedical, chemical and process engineering, there is, in addition to better understanding cause and effect in living systems, the promise to unravel disease mechanisms, validate drug targets and discover new drugs, and the potential to create a personal, population and predictive medicine with application for both prevention and treatment.

The big challenge for public health is to bring together all appropriate information and to apply it appropriately. The exact roles of several stakeholders (including overlapping of roles) needs to be better defined to pull together in the same direction.

Dr Balasubramaniam, in his keynote address, explored the current state of health in India and the issues and challenges ahead of us. If development issues are addressed in India, the MDGs will be met automatically. There are 18 targets in the MDG, which would be measured by a set of 48 indicators. Of them, 4 goals, 8 targets and 18 indicators are directly related to health. These four goals dwell on the most critical issues in health today, viz., Infant and Maternal Mortality, HIV, Malaria and such other communicable diseases and Environment Sustainability. Our targets set under the National Health Policy of India, National Population Policy (NPP) of India and the 10th Five Year Plan of India are all in line with the MDGs.

Setting dates and timeframes can sometimes become a limitation, though they do bring in a sense of importance. The danger of the data not being seen in a disaggregated and situational context is also real and needs to be considered. The MDG targets are important and urgent, to be achieved here and in the present and not to be kept waiting for fulfilment at a future date.

India contributes 2.4 million of the global burden of 10.8 million under-5 deaths. Nearly 26 million infants are born each year. 1.2 million of these infants die before completion of first four weeks of their life and 1.7 million die before reaching the first birthday.
Ensuring safe motherhood is one of the biggest challenges facing India today. WHO estimates that out of 529,000 maternal deaths globally each year, 136,000 (25.7%) is contributed by India. This is the highest burden for any single country in the world. As per National Family Health Survey estimates, the Maternal Mortality Rate in India is 540 per 100,000 live births. Adding to the problem is the fact that only 33% of deliveries occur in health institutions. It is indeed a great challenge to meet the target of NPP, i.e., to increase the institutional deliveries to 80% by 2010.

Essential obstetric care is still not available in most primary health care centres. For example, there are 1786 Primary Health Centers in Karnataka, but as per the Health Task Force Report, only 8% of them conduct deliveries round the clock. Impacting maternal mortality needs the provision of care 24 x 7 in an institutional setting. The likely solution: add more doctors or people with skills to conduct deliveries. Alternatively, improving the referral system, transport and communication facilities could be a completely new non-medical solution to this problem. There are initiatives in a tribal belt of Karnataka that has trained and used human resources from within the tribal communities. Wireless handset to improve communication and a small lump sum to cover emergency travel has helped to increase institutional deliveries from 2% to 36% in an 18 month period of time.

**The key question is:** All efforts channelize towards making institutional care happen. **Is the required infrastructure to cater to the increased load available? If people start coming to hospitals for care, can we guarantee good care to them?**

According to recent estimates, there are about 5 million HIV infected people in India and including thousands who need Anti Retrovirus Therapy. Can the public health system cope up with such a demand? Some of the states in India with good health indicators are unfortunately the ones with high HIV prevalence. HIV/AIDS has to be accepted as a chronic liveable disease, just like diabetes or hypertension. Care has to be taken that programs addressing HIV do not become vertical programs. The role of primary health care centres has to be well defined.
Today, only 42% of children in India are completely immunized. The point of first contact of the health care delivery system is the Auxiliary Nurse Midwife (ANM). If only she could forge an ‘effective partnership’ with the local Integrated Child Development Service (ICDS) worker, the coverage could be increased significantly. Maintaining cold chain is yet another challenge. Despite advances in the field of solar power, provision of refrigerators to our PHCs and sub centers is still a dream.

Planning and prioritizing health interventions often use patterns of mortality data. 48% of mortality in India is because of Non-Communicable Diseases and 42% because of Communicable Diseases. But most public health programs in India target communicable diseases. The focus has to shift towards NCDs. 10% of the deaths are due to injuries, mostly caused by road traffic accidents- a direct indicator of the poor state of our roads or maybe the lack of emergency care. Occupational safety is not a priority.

Malaria, today, is making a worrisome comeback. There are about 2 million malaria patients today. Increasing number of falciparum cases, especially cerebral malaria, and chloroquin resistance is a matter of great concern. Mortality from malaria still exists. With science having advanced so much, this is utterly shameful.

One of the critical factors for success of the Revised National Tuberculosis Control Program (RNTCP) has been the infusion of managerial systems in planning, documentation, implementing and monitoring. The concept of ‘External Change Agents’ facilitating the role of multiple players in this program is something that can be emulated. Multi drug resistant TB is on the rise adding to the complexity of the issue.

In India, half the IMR today is because of 4 states. 72% of IMR comes from 8 states alone. 74% of rural women are anaemic even today. Only 8% of rural population has access to a toilet. Only 21% of the rural population has access to safe and sustained source of drinking water. Only 3.9% of them have a pucca house with drinking water and an electricity connection. Only 6 out of 100 children who join first standard
actually complete the 10th standard. Good health is strongly associated with good education.

MDGs and progress need to be measured keeping in mind this inequitable situation and the pervasive gender inequalities, the urban-rural divides, the inequities between states and also within the states.

Programs (including planners) focus usually on rural health. But urban health in India is a disaster. The focus of most urban bodies is on issues other than health and education. Very few Urban Local Bodies have a strong urban PHC system. Making the urban bodies realize their responsibility towards healthcare is a big challenge.

Medical education is becoming extremely expensive. The expenditure on medical education has increased by leaps and bounds. Obviously, with this kind of an investment on education, people are going to look at returns and not service. Returns can happen only in urban areas. So, in effect, a situation is created where people are forced to stay back in urban areas. Even if a doctor wants to go to a rural area, it is economically unproductive for him or her. 80% of the doctors cater to only 20% of our population. Regulations maybe needed to ensure that doctors serve in rural areas. With many states bringing in strong Anti-quackery laws with no replacement strategy, a vacuum will be created in rural areas by eliminating non-qualified practitioners. A ‘Physician Assistant’ cadre who could be trained and equipped to handle the basic minimum services maybe an alternative.

The current health care system is heavily doctor dependant. But doctors are best left to take care of patients. The hospitals need to be managed by professional managers and they need not be doctors. Doctors too should be trained in basic tenets of management during their graduation. India is woefully inadequate in generating Public health specialists and Health care Managers. The present trend of creating more Hospital administrators alone will not suffice-there is a need for qualified health care managers.
There have been huge investments on infrastructure. Beautiful buildings have been built with World Bank and other donor funds, but many of them have not been occupied. The location of the infrastructure is mostly decided by the political system. There is no organized mapping of the health facilities. Decision making should be based on objective parameters. Governments should take the courage to relocate or close down under-utilized PHCs.

The NFHS survey clearly indicates that 76% of the health infrastructure belongs to the state but only 34% of the people access it. This necessarily means that the private sector, having just 24% of infrastructure is catering to 66% of the population. Surveys have shown that people do not prefer Government hospitals because they do not give quality care and quality in their minds means only two things: cleanliness and courteous interaction of the care providers. Is it so difficult to take care of these two things? Most of the qualified human resource today is in the public sector. The private sector is functioning with a significant amount of non-qualified or under-qualified human resources. Quality considerations in the private sector are abysmally bad. What drive the private sector are profits. This being the case, there is a need to bring in a lot of interventions.

Public Private Partnerships has now come to mean just handing over hospitals and outsourcing services to the private sector. Though this arrangement has brought in some change, mostly in terms of managerial efficiency, it is questionable if benefit really reached the beneficiaries (the poor). The Government is also looking at private people as contractors and not as partners.

It has been clearly stated in the National Health Policy of India that by 2007, 5% of GDP should be spent on health and this figure should go up to 7% by 2010. Only 15% of health expenditure is public spending and the rest 85% is out of pocket expenses. Government spending on health is gradually decreasing. Even the money allotted is for maintaining infrastructure and paying salaries. So that leaves hardly any money for programs.
A proper costing of health care interventions that feed into an appropriate charge-to-patients system has to be developed. Most of the current indicators are measuring effectiveness and not efficiency.

The top 20% of the country (in terms of wealth) has access to 85% of resources and the bottom 20% has access to just 1.5% of India’s resources. Ensuring that bottom 20% get access to health care is a major challenge.

52% of our population is below 25 years but there is no program to address the healthcare needs of the adolescents. 411 million children today are around 14 years and 131 million of them belong to socially and economically disadvantaged groups. These are the groups which have also been traditionally denied access to care. These adolescents need special attention and a health care program for the adolescents is a matter of priority.

The pharmaceutical industry has grown by leaps and bounds in the last decade. But unfortunately, their stake is in the ill-health of this country. Medicines remain expensive and there is no rational drug usage in this country. Market attempts to influence doctors’ prescriptions are evident. Investment on research and on generic medicines is very low.

Newer drug delivery mechanisms, research on cancer, development of vaccines for diseases like malaria, HIV/AIDS, and other diseases are needed. In a country like India, traditional and indigenous systems of medicine are a good resource. AYUSH however, has become just a slogan, a matter of convenience without conviction. Ayurvedic doctors are being looked at as a cheap replacement for allopathic doctors in the public health system. This attitude has to change. AYUSH should be respected for what it is and given the place it deserves.

Decentralization in administration is wonderful. But Panchayati Raj institutions still do not have control over the PHCs. An attempt was made in Karnataka to ensure that ANMs and Anganwadi workers would report to the Panchayats; the government had to back track bowing to pressure from several quarters.
The relative importance given to HIV/AIDS as a public health problem is a little disturbing. Malaria kills more people than HIV in a year in India and so does TB. In fact, TB kills more people in a day than HIV does in a year. Though there is a Global Fund for Action against Malaria, Tuberculosis and HIV/AIDS (GFATM), the focus is more on HIV than the other two.

Vector borne diseases are making a huge comeback in this country, whether it is chikungunya, dengue, malaria or kala-azar. Posts of entomologists are lying vacant across this country. Training for medical entomologists has stopped 20 years ago. There is a need for a proper vector mapping system.

The inability to distinguish between medical care and healthcare is a very disturbing factor. Healthcare is often confused as just building hospitals. There is a need to understand healthcare in its entirety.

Health Insurance is coming to India in a big way. But there is a blind imitation of the western models. Health insurance can piggy-back on the micro-insurance concept on the Self Help Group movement. A community financed and community managed scheme that looks at social and not just economic criteria for enrolling people into insurance may be ideal. Inclusivity as opposed to exclusion has to be developed as a criterion.

The greatest concern today is good governance. Corruption is rampant. There is a saying that ‘India is a highly developed nation in an advanced state of decay’. People today have come to believe that extra payment to the doctor at the hospitals can guarantee them good care. This disturbing trend is on the rise and has already assumed threatening proportions. Politicians demand their pie everywhere, right from postings to procurement. The Drug Procurement Society in Tamil Nadu is doing a fairly good job since it is relatively free from political interference. It is also a good example of what good governance can do. Such models have to be evaluated for replication across the entire country.
The production of wheat in this country is 79 million tons in a year. It has gone up drastically from 6 million tons in 1930. This is an example of just one crop and wheat is not even the staple food across the country. In spite of such humongous production, 360 million people still get less than 1000 kcals/day. In India, the average expenditure on food is 70% of the income. When feeding hungry mouths is the priority, health naturally takes a backseat unless the relation between food and health is better understood.

Policy makers are often away from grass root realities. People do not question policies. India is a low energy democracy. Civil society initiatives too are very few and far in between.

Consider data management in the public health sector. The ANM is asked to collect and report volumes of data from the field although a mechanism to verify the authenticity of such data is not well set. The data however, ends up in a pile of reports without information flowing back to the ANM in a manner that will help decision making.

Health care cannot be viewed in isolation. It is just a part of the larger picture. Translating economic success into human development advances will require public policies aimed explicitly at broadening the distribution of benefits from growth, increased public investment in rural areas and above all, political leadership to end poor governance and manage the underlying causes of gender inequality. Like Prof Amartya Sen has put it, ‘India needs to look at Economic gains of Social reform rather than the merely at the Social rewards of Economic reforms.’

The panel discussed the need to find ways to activate the government system to function to its optimum best. The critical issue is the translation of knowledge into action. What is clearly not known is a mechanism to apply knowledge effectively, and to make connections work optimally. Left alone, health systems will continue to function as they do now. The political system focuses on today and not so much as on the future. It is important to figure out bright spots that actually do work, rather than what does not work, and work on trying to understand how to bridge the
knowledge to action gap. The need for a “safe space” to experiment solutions without the fear of recriminations in the absence of success was emphasized. The need for effective analysis of information and for wider communication or dissemination of information, and a need to develop new knowledge were emphasized.

There is a need to build bridges between different sectors, and with communities. The government system is not always responsive or does not respond fast to demands, and new solutions are needed for public health problems. Delivery of health care is a crucial issue. How long it takes to put a system in place in the government or to reform an existing system is an important factor. Maybe it is better to set up a parallel private system that will increase the pressure on the government sector to reform. An example from the banking sector is available where ICICI Bank set in place systems and processes that transformed banking system in India and the government system had to follow. Much energy can be spent bothering about the inefficiencies of public health system but energy needs to be spent on building solutions, even if it is in a private system. This need not mean the creation of elite blocks of health care infrastructure but can be initiatives similar to the rural education initiative of several corporate houses that are self sustaining and cater to all sections of society.

Tighter monitoring to get more out of government system may sometimes lead to a more systematic exclusion of the government system from the process. More autonomy, taking more risk in the government system, and offering them more freedom (in essence looser control) may in turn motivate the public sector to function more efficiently.

There are several issues to be considered including transparency and governance and these are not limited to the government sector but present even in the non government sector. A looser control may in fact destroy the system further given the current climate of failed accountability. Strengthening the social audit system will be more beneficial and communities have to take ownership for the system.
Delivery is not a one sided process, it involves the community also, and solutions maybe better sourced if we use a demand and supply improvement process.

Outcomes analysis takes a long time with inputs and outputs not simultaneous or within a reasonable time frame. There are issues of limited transparency and there is a need to ask about outcomes that are really important. Providing safe space does not remove the need for accountability. Health care is not about diseases but about the health of the population. The ICDS in India is an example of an initiative towards an early lifecycle approach.
Traditionally, governments are the major players in health care delivery especially related to public health. Governments across the world demonstrate their intent of concern for the health and education of populations by financing, providing or regulating the provision of services that influence health and education outcomes. These services are replete with market failures - with externalities - that traditional schools of thought have questioned the ability of a profit driven private sector to provide necessary services that will help communities achieve the desired levels of health or education. However, changing demographics and changing complexities of disease including epidemiological transition are placing greater strain on the public sector. Responsiveness to changes needs rapid solutions and heavy investment in people and infrastructure, something that governments are increasingly finding difficult to address as other priorities compete for its attention.

Services are failing poor people. Health budget allocations that actually are spent on poor people are abysmally low. The money does not always reach the frontline service provider. Incentives for service delivery are weak, wages are often not paid on time, corruption is rife and political patronage is accepted as a way of life. There is also an increasing lack of demand for services from the public sector. People increasingly prefer the private sector for services equating higher charges with accountability and better quality.

Worldwide, governments are aware of the need to develop alternative service delivery arrangements and are engaging the private and not-for-profit sectors. Some governments contract services out to private or not-for-profit agencies. Governments also sell concessions to the private sector. Some societies have transferred
responsibility to lower tiers of government as part of a decentralization process. Responsibility is sometimes transferred to communities, or to the clients themselves. Sometimes, resources and responsibilities are transferred to the household as a unit.

India has not been an exception to the global trend of non-government players becoming more active in the delivery of healthcare. There are several models in the not-for-profit and profit sectors that have changed the way health care has been delivered in India.

The key questions are

a) How do we get the government and the not-for-profit or profit sectors active in health care to work together towards a common end? How do we supplement efforts in each sector without competing with each other?

b) Are the models of apparent success in the not-for-profit or profit sectors replicable on a national scale given the magnitude of the scale up needed in India?

c) Are the models of success in the not-for-profit or profit sectors sustainable after discounting potential subsidies provided by the government?

d) Do the indirect benefits of such models span the MDG even though the primary focus of the models may be narrowed down to one priority area or disease?

The conference heard from several subject experts working predominantly in three different public health themes who brought different perspectives to the table. Dr. Abhay Bang, from Gadchirroli, Maharashtra brought out different facets of the SEARCH model that focuses on maternal and child health as an entry point for overall development in tribal areas, Dr Devi Shetty, from Bangalore, Karnataka presented the nuances of a cardiac care model that reaches out to disadvantaged populations, and Dr R. Balakrishnan from Madurai, Tamil Nadu illustrated a well designed business strategy to demonstrate how a technology solution addressing a public health problem in India was scaled up to achieve a sustainable national and now global presence.
The Home Based Neonatal Care (HBNC) program is initiated by the SEARCH team. The objective of the program was to reduce neonatal mortality by developing a low-cost, home-based model of primary neonatal care by using the human potential in villages. The program was initiated at Gadchirroli, an agrarian economy typical of most of rural India. The community participatory process of the program is a highlight and the program was initiated after a series of discussions with the local community to understand their priorities as well as to better inform communities of what was hoped to be achieved through the program. At inception, 95% of the deliveries in the project area were home based, and 54% of the children needed medical attention post delivery. However, only 2.6% of these children were ever seen by a doctor, and only 0.4% of these children were hospitalized. The primary cause of neonatal mortality was sepsis (52%) and asphyxia (20%). Fifteen percent of children were premature. The SEARCH team initiated a series of interventions that included health education, attending home deliveries with Trained Birth Attendants (TBA), care of baby at birth, home visits and support, and management of sick newborns including birth asphyxia, low birth weights (LBW) or preterm babies and babies with sepsis or pneumonia.

A control area was carefully chosen and the characteristics of the control area were similar to that of the area where active interventions occurred. At baseline, neonatal mortality in both the intervention and control areas was around 60 which reduced to just above 20 in the intervention area over a ten-year period. The neonatal mortality in the control area, however, remained slightly above 60. The reduction in neonatal mortality was primarily through a sustained reach resulting in high coverage of the population at risk and a high quality of care, changes that could be brought about in the belief of mothers and their behaviour, reduced incidence of morbidities, and reduced case fatality in the main morbidities by more than 50-70%. There was reduction by 6 points each year for infant mortality rate. The SEARCH team found that the interventions had an effect on maternal morbidity- maternal morbidity reduced by 50% and maternal referrals increased.

The success of the model was essentially a tribute to the human potential involved. These included the mother and grand mother of the child, the trained birth attendant
(these three persons exist in most villages across India) and the newly introduced community health worker (trained by the SEARCH team). The community health worker was selected from the local community initially by the community, and later after a process of knowledge transfer confirmed by the SEARCH team. The community health worker is provided a kit to aid in her work and is paid 500 rupees per month. The payment is performance linked shifting the motivation of the work from the money received. The SEARCH interventions were cost effective compared to other models. The SEARCH model cost 7 US $ per DALY compared to 14 for zinc fortification, 47 for zinc supplementation to children, 86 for case management of pneumonia, 194 for oral rehydration therapy, 237 for vitamin A fortification, 2137 for vitamin A supplementation, and 8235 for growth monitoring and supplementary food to undernourished infants.

The SEARCH model is now being replicated through the not-for-profit sector in 7 field sites of Maharashtra as part of the ANKUR project and through the government in 5 field sites of 5 states of India. The SEARCH team places tremendous focus on the training component and have brought out a manual to aid in standardized training of community health workers. Results from the ANKUR project are promising with neonatal mortality reducing from 46 at baseline to 24 at the end of the third year, and infant mortality rate reducing from 62 at baseline to 36 at the end of the third year.

The SEARCH model has achieved a lot considering that the infant mortality rates in India are about the 58 mark, with a national goal to reduce IMR to 30 within next 5-7 years. 2/3rd of the infant mortality occurs in the first month of life. New born period is 59 times riskier than the rest of the childhood.

The medical community needs to be less monopolistic, and be more willing to transfer skills to community level workers. Women in our communities have the potential to perform complex tasks and perform them well. A major benefit from the program has been the self esteem it has provided to women in these communities.
Aurolab, Madurai, India provided a different perspective, essentially focusing on how a good business plan can help sustain and scale up operations of importance to public health. The Aurolab model of the Aravind Eye Care System at Madurai, Tamil Nadu produces a medical device—the intraocular lens—that is of importance in the surgical restoration of sight for persons with age related cataract. Blindness is a major public health problem worldwide with an estimated 45 million people blind from various eye diseases. 12 million of these blind persons live in India including 1 million blind children. The most common cause for blindness worldwide is the age related cataract. Restoration of vision, traditionally, has been through the removal of the cataractous lens and replacement of the lost optical power of the eye through an artificial lens placed in a pair of spectacles. The intraocular lens has been a relatively new development where the artificial lens is now placed inside the eye in a position as close as possible to the removed cataractous lens. This helps improve visual outcomes of the surgery with fewer short term and long term complications. The development of the intraocular lens (IOL) and refinement of surgical techniques and instrumentation to accommodate this new development led to a change in indications for cataract surgery in the more developed nations. The indications now shifted from surgery to restore vision to surgery to prevent loss of vision. The benefits of this technology, however, took a long time to reach the developing world. Several studies have suggested that blindness and cataract are more prevalent among the disadvantaged populations. It follows logic then that the maximum benefit of this technology can be attained if it could be delivered to disadvantaged populations.

Aurolab evolved out of this dilemma that Aravind Eye Care System faced. There was a huge backlog of patients needing cataract surgery, the IOL was a better option compared to the traditional cataract surgery, yet the costs of importing the IOL limited the surgery to only a few who could afford it (over Indian rupees 3000 per lens). Aurolab was promoted by Aravind Eye Care System to indigenously produce the IOLs importing the same science that was used to develop IOLs outside the country. Aurolab was incorporated as a not-for-profit organization in 1992 with stated objectives of producing affordable quality eye care products in a self sustaining model. The initial technology was imported from the USA with the manual labour
performed at the labs of Aurolab. A well thought out business plan was developed to place the IOL in its own appropriate niche. As operations stabilized, Aurolab initially sold all developed IOLs to the parent organization for use within. Besides the presence of a tailor made market, this allowed for Aurolab to scientifically validate the products and obtain real time feedback on possible improvements to the product including surgeon and beneficiary satisfaction.

Once operations had reached a level where production could be increased further, Aurolab rolled out the sale of IOLs to different players in the national eye care market. The IOLs were rolled out with a differential pricing system that offered lower prices to organizations in the not-for-profit sectors compared to the private sector. IOLs were now available for as low as 500 rupees per lens compared to the market rates of 3000 rupees per lens for an imported lens. The quality of the lens is not inferior compared to the imported lenses and has been tested extensively.

The rapid diffusion of IOLs into the market spawned a whole set of changes in cataract care delivery. Human resource training to perform the new procedure was now offered as specialized courses and incorporated into the ophthalmology curriculum. Persons from local communities were employed at Aurolab improving the economy of surrounding villages. Hospitals and surgeons now performed the more satisfying IOL surgery for cataract surgery that had fewer complications increasing patient compliance to advice - this resulted in leapfrog in the number of cataract surgeries that were performed in India with consequent implications on blindness.

There were a lot of additional benefits. The increasing patient demand for cataract care specifically with IOL led to a large demand for training support staff for medical services, usually sourced and trained from local communities by hospitals. There was a need for additional support infrastructure including microscopes, slit lamps, and even pharmaceuticals and sutures leading to a boom in several other industries.

The major impact, however, has been on the burden of blindness. Several million people from disadvantaged populations now see well. Aurolab now exports the IOLs
to several countries worldwide including Europe. Several companies in India and other resource poor countries like Nepal have now started indigenous IOL production. A structured training program for ophthalmologists from resource poor countries is available at many centres across India. Aurolab is now expanding to other products including instrumentation, pharmaceuticals, sutures and surgical blades through the profits accrued from the production and sale of indigenous IOLs that are still affordably priced. Aurolab has incorporated the latest technological advances to manufacture the latest IOLs in the world market with no lag time.

There are also cardiac care models that reach out advanced cardiac care to disadvantaged populations. 100 years after the first heart surgery was performed; only 8% of those who need surgery can afford it. Of the 6.5 million heart surgeries performed globally, 4.5 million are performed in the USA alone. India performs approximately 70,000 heart surgeries each year compared to a need of 2.5 million heart surgeries each year. Indians are three times more vulnerable for heart disease than Europeans. Dr Shetty gave a brief about Narayana Hrudalaya, a 1000 bed heart hospital at the outskirts of Bangalore with 26 operation theatres. About 30 heart surgeries are performed each day at this hospital. Prices are affordable with an angiogram costing rupees 4500 and a heart surgery performed for rupees 65,000. Several developments are occurring including the development of a health city using heart care as the driver of resources with revenue focus shifting from inpatient care to outpatient care, development of generic drugs and the development of the health city into an academic research institution. The institute trains MBBS doctors to provide first line cardiac care at the village level with trained women from villages running the labs. The institute has also developed a health insurance for cardiac care with a monthly premium of 50 Indian paisa for one person. The institute has developed and pioneered a low cost and affordable ECG network that aims to have an ECG machine in every GP office with a software that transmits the readings through telephone lines. It is proposed that the ECG machine which now costs 5000 rupees can be given to doctors free of cost.

India currently trains only 80 cardiologists a year as opposed to the need for at least 2000 to 3000 cardiologists to be trained each year. The institute has developed a 2
year structured program for MBBS doctors and tried to get accreditation from IGNOU but ran into several roadblocks. The institute is now funding the program itself and is offering a diploma in community cardiology through 26 hospitals in India.

The conference heard a presentation on Saantwanam, a project in Kerala initiated by Health Action by People, Kerala, and Kudumbashree of the State Government of Kerala and State Bank of India, aimed at addressing lifestyle diseases. The objectives of this program are to screen for diabetes mellitus, overweight / obesity, hypertension and underweight / growth retardation, with referral services and health education. The strategy involves recruiting and training young women volunteers from local community, provide equipment, deploy them in the community, keeping meticulous records, referral of newly detected cases, and provision of logistic support. The following were measured at the community level - Blood Glucose, Blood Pressure, Height, Weight, Body Fat and BMI [calculated]. The caregivers were selected based on the following criteria a) shall belong to a poor family [BPL], b) shall be nominated by local Self Government & Kudumbashree, c) shall have 12 years of schooling with science background, d) shall undergo one week residential training, and e) shall have two wheeler driving licence. The expense per trained worker came to rupees 50,000 of which 7500 is given as a subsidy by the government. Each worker is provided a two wheeler as a loan from the State Bank. Blood glucose was charged at rupees 25, blood pressure at rupees 10 and body mass index at rupees 5 per assessment.

During the panel discussion, the relative importance of money and resources was brought up. It was mentioned that 42 million people in US are not covered by health care. Health insurance schemes often have adverse selection process and perverse incentives. People do not develop personal responsibility for their health. World over, there is a crisis of health care delivery especially as people now live longer. Models used in the past for health care delivery may not have the answers for the future or even the present. Given the state of transition of diseases and illness, failure of the models is inherent in the mix. A fear of failure, however, will limit the exploration of different models. The role of education in the different models especially the model from Kerala was discussed. The need to reduce costs for the
different models was discussed. The possibility of using school children as health communicators and for diabetes screening using an example from Andhra Pradesh was briefly discussed.
4. Improving Rural Health in India

Key Presentations:  a) Dr. Yogesh Jain  
           b) Dr. Nerges Mistry

Chair: Dr. Prasanna Hota

The delivery of health care to rural populations in India remains a conundrum. Improving health outcomes for the poor is a complex task. In addition to income, several factors influence health outcomes including age, ethnicity, gender, social status, religion and residence. Girls in India are 30 to 50 percent more likely to die between the ages of one to five years than boys. Services such as education, water, food security, communication, electrification and transportation assume great importance.

74% of rural women are anaemic even today. Only 8% of rural population has access to a toilet. Only 21% of the rural population has access to safe and sustained source of drinking water. Only 3.9% of them have a pucca house with drinking water and electricity connection. Only 6 out of 100 children who join first standard actually complete the 10th standard.

Development has been skewed and dictated more by political compulsions than the realities. A health care infrastructure map does not exist. Medical professionals have excluded traditional providers of health care in rural areas from their ambit and have not worked on transfer of appropriate knowledge. Such exclusion of service providers has not been balanced with an influx of trained human resources as a replacement. Primary health centres are not always accessible even if they are available or affordable. Even if distances to the nearest health centre appear small on paper, approach routes may not always exist.

Health care and development are a vicious circle for rural India. Poor health has contributed to poor development. Poor development has resulted in trained human resources including medical professionals preferring to stay in urban areas, resulting
in high absenteeism. Communities have to depend more on the unregulated private sector for services. Issues of quality persist for all sectors of healthcare in rural areas in the absence of community monitoring.

Financing of healthcare in rural areas is an issue. Insurance policies are often not flexible or sensitive to the needs of rural populations. Financing of rural healthcare is often equated with provision of “free” services either as a strategy (to generate more revenue for the service providers from aid agencies) or as a policy (as in the government sector).

Strangely, there is an influx of advanced tertiary care into rural areas even as primary healthcare services are dwindling. Expensive technology oriented solutions like telemedicine are offered where finances could have been placed for simpler cost effective preventive and primary care measures. There are several examples in India where simple solutions focused on optimal utilization of local resources including human resources have resulted in dramatic improvements of health care indicators.

Additionally, rural India now has to compete with the urban disadvantaged for a share of the healthcare allocations. This is a tragedy because the displaced rural poor often make up the urban poor. The epidemiological transition in rural India adds to the problems facing healthcare providers.

The key questions are

a) How does one use technology to supplement rural healthcare services?

b) How does one ensure that technology inputs into rural health care provide equitable and affordable care with cost benefits and good health outcomes?

c) How does one use technology to address the non technical barriers to quality rural healthcare?

The conference heard from two subject experts, Dr. Yogesh Jain of Jan Swasthya Sahyog, Bilaspur and Ms. Nerges Mistry of the Foundation for Medical Research, Mumbai.
There are several issues to be considered while developing innovations for rural healthcare. These include assessments if the innovations improve access, the effectiveness of the interventions, if the interventions improve equity, whether the innovations obfuscate the real issues and if the innovation is only a shortcut to the end. Non technical solutions for several problems of the rural poor are required if rural health is to be improved. Non technical solutions for reduction in availability of food, targeting in health care, the conundrum of user fees, increasing reductions in the allowances available through the public distribution system, increasing food prices and the whole gamut of public private partnerships and the benefits that percolate down to the poor are a major priority. Several aspects of technology inputs need to be considered including appropriate guidelines, public health practices, techniques, regulations, and useful technologies. The Tuberculosis and Leprosy programs are examples where the lack of clarity pertaining to appropriate guidelines posed problems. For example, the RNTCP document 1997 states that “for adults, drugs will be given in the recommended number of pills/capsules irrespective of body weight. However, for patients weighing more than 60 kilograms an additional capsule of rifampicin 150 mg will be added to the treatment regimen.” Technical guidelines were not necessarily evidence based and evidence was often not incorporated into the guidelines. Issues relating to early and rapid diagnosis, drug resistance and sensitivity to medications assume importance for rural health especially since communicable diseases still prevail in rural India. The National TB program aims to achieve 70% case detection and 85% cure rate and thereby achieve control of the disease and make an impact in 15 years. However, control cannot be achieved only through case detection and treatment of those with disease. In the Chingleput tribal area in spite of 95% case detection rate and good cure rate, there was an increase in the incidence of sputum positive tuberculosis in those who were uninfected at the beginning of the study. (T Jacob John: Tuberculosis control without protection from BCG. Indian Pediatrics, Jan 2000). Guidelines are often medication specific and do not consider the whole picture, like for example, the importance of nutrition. A sputum concentration test developed by Dr Vasanthakumari at Chennai, tested in 1900 samples, demonstrated a 96% yield in sputum but still has not been utilized by the National Program for Control of Tuberculosis. There is a need for price
regulations and control over new technologies, vaccines, drugs for these developments to have a wider reach in rural India.

Several challenges or bottle necks to improve rural health were discussed. For instance, how can we ensure that we get a correct diagnosis of malaria within 24 hours? The difficulty of reaching a sample to a lab, and getting the report back in a reasonable time frame was discussed within the context of having to provide care for a rural person who may already have traveled long distances. A model that uses school children and public transport for the transportation of blood samples was presented. Other issues of concern include, how do we improve the yield of sputum in diagnosing tuberculosis practically and with an inexpensive test and potentially avoid radiographs? How do we know the drug resistance pattern in patients with tuberculosis early enough to decide treatment choices?

Several innovative solutions developed to help community health workers with the diagnosis of urinary tract infections, vaginitis or cervicitis, and anaemia was discussed. The one time cost of the capifage (for anaemia) was rupees 1500 with each test costing less than one rupee. A breath counter is available for rupees 300 that will help even a neo-literate health worker to assess lower respiratory tract infections. Technology solutions to detect a rise of body temperature (easier than the conventional thermometers), to assess if the water is potable and to disinfect water, modular delivery kits have been developed. Need in rural areas has led to a lot of improvised solutions that do not necessarily get into the public domain or are not accepted. Solutions for rural health do not necessarily have to be cost intensive.

A balance has to be struck between what the public really want and what policy makers want the public to have. Lack of accessibility to health centres, lack of information and erroneous treatment from health staff remain major issues. The relatively lower rates of literacy and enrolment into technical streams and technology diffusion are areas of concern. Issues like lower priority for health care, lack of information and family support, lack of transportation, lack of money and social taboos or beliefs still influence the uptake of health care.
Women continue to die before reaching adequate services. Among all CHCs in India, labour rooms were available in only 27%, labour kits in 48%, qualified obstetricians in 30% and anaesthetists in 10% of centres. It was stressed that several criteria need to be examined prior to adoption of a new technology including a) defining and agreeing on the need for the technology, b) need of data on disease burden and modes of transmission, c) cost effectiveness of the technology solutions including advance planning for adequate funding, d) provision for appropriate service delivery with sensitiveness minimizing stigmatization, e) increasing awareness and education regarding technologies.

There are several technological innovations developed by research institutes in India like detection kits for filariasis, leishmaniasis, dengue fever, west nile virus, typhoid, HIV, and kits for the detection of pregnancy. Many of the diagnostic tests that are marketed & available in primary healthcare settings in developing countries are sold and used with little or no evidence of their effectiveness. This is because unlike drugs, diagnostics are not subject to strict regulatory approval standards. During 2006-07 diagnostic tests for malaria, TB, dengue, schistosomiasis and sexually transmitted diseases will be evaluated in their intended settings & the evidence communicated to policy makers (WHO TDR news 2006). Possible roles for Health Technology Assessments (HTA) in India like responsible incorporation of technologies, development of framework of cost-effective / benefit analysis based on rural conditions and needs (Dye et al, 2005, Sculpher et al, 2004), publicly reported data on quality of health care (Broder et al, 2004), identify factors for high volume, high quality work (Thulsidas et al, 2006) and HTA (PD and T) of major conditions (Kirkwood et al, 1995), facilitate and guide indigenous health technology products e.g. blood bags, titanium implants, heart disc valves (Chitra Tirunal Institute), provide health information advising consumers and policy makers and planning integrated curative and investigative services. The politics of diseases and their implications on research and development was discussed. Technologies maybe high priced and patented or disproportionate to the global burden of disease or through sheer serendipity. Public health demands cost-benefit ratio, reduction in mortality and morbidity and reduced side effects, while market demands need demand, technological feasibility and returns on investment. The politics of multi-country
agreements that favour developed countries at the expense of premier research institutes in developing countries is a concern. Double or triple standards for a single indicator exist - potable water and pesticide residue analysis in India is an example. There is a lack of support services for a society that is willing to invest in health care, is increasingly demanding high quality at affordable prices, and in societies with a rapid disappearance of the urban rural divide.

The panel discussion explored the process of engagement of different stakeholders. Optimization, including scaling up of technologies is important. Restricting spheres of activities to islands of excellence is not sufficient in the long run. An agenda of actual and sustained delivery has to be nurtured. Money in public health is not to be scoffed at and should be allowed to play its legitimate role. Money is not the only incentive for people to perform, other incentives including accountability is necessary for optimal performance. The choice of community workers is thus important. Urban poor are as disadvantaged as rural poor. There is a definite role of government institutes like ICMR, DBT and DST in universalizing technology. There is also a need for business plans that will help scale up good technologies.
5. Emerging Healthcare Challenges

Key Presentation: a) Dr. Bala S Manian
                b) Dr. Ratna Devi

Chair: Dr. Bala S Manian

Health states and disease or illness are in a state of transition worldwide. New communicable diseases or variants of existing communicable diseases stalk the world even as the epidemiology of diseases shifts towards non communicable diseases. The threat of bioterrorism is acute. Health systems have to be in a constant state of responsiveness and need to respond fast.

The public sector health infrastructure is huge with reach all over the country and hierarchical structure for information flow. Responsiveness is faster in the private sector and to some extent the not-for-profit sector compared to the government sector. The faster and relatively “more” efficient responsiveness of the private and not-for-profit sector has seen a shift of patient access to these sectors from the more affordable government sector. This has led to a debate on the role of the public sector in public health with increasing calls for transfer of responsibility from the public to other sectors. However, epidemics do not remain localized in developing countries and have the potential to spread fast and wide. SARS is an example of such an epidemic. It is the public sector health system that has the potential to respond with wide coverage in such situations. The challenge is to optimize interactions between the government and other sectors to meet health care challenges.

Information is crucial as is what we do with the information collected. An emerging healthcare challenge cannot be identified unless there is information on the existing healthcare challenges. The burden and trends of diseases and modes of transmission have to be known. A mechanism to constantly analyze this information and to disseminate information to the policymakers and ground level personnel is needed. This information flow may lead to the development of need based innovations.
The key questions are

a) How do we detect emerging healthcare challenges early?
b) How do we deliver services integrating public and private sectors?

The conference heard from two subject experts, Dr. Bala S Manian of ReaMetrix Inc, CA and Bangalore, and Dr Ratna Devi of Byyraju Foundation, Hyderabad.

Diagnostics is an important component in disease management and maintaining wellness. Diagnostics is an information business. Information is generated to help the physician and to a certain extent, patients make better clinical decisions. There is a cost to the information collection - for example the cost of the acquisition, transport and processing of sample(s), amortization cost of the capital equipment, laboratory infra-structure, overhead costs and other intangible costs. These costs are usually influenced by the macroeconomic situations of the country (usually the more developed nations) in which the technology was produced. Macroeconomic impact on design decisions and process developments can be subtle and indirect; design criteria optimized for one environment may not be the right solution for another. Labour costs drive and dominate the Cost of Goods and Services (COGS) in the more developed countries. Material costs drive the process in resource poor countries. Currently, MNCs consider emerging country markets as secondary to the existing markets. The temptation is to reduce features to reduce cost rather than to re-engineer products to meet the needs of these secondary markets. Since the development is done in the expensive labour market, the development cost necessary to re-engineer can seldom be justified. Leveraging local resources to solve local problems is the only way to achieve economically sustainable solutions and to shift the paradigm. Define “the affordability index” in the context of local macroeconomic environment keeping in mind that affordability is a balance between costs and quality. Affordability index drives the appropriate technology that can deliver the good and services within the affordability index. Increased demand then drives the cost economics but local economic participation is essential for sustainability.
The example of dry reagents is an illustrative example. In resource poor settings, cold chain transportation costs can be high adding to the cost of the test. A unique process for drying down the reagents enables ReaMetrix to ship the reagent without any cold chain requirements. The real challenge lies in transporting blood samples from remote areas to centralized testing centers. Often times, this leads to “aged” blood samples (> 48 hrs) that are unusable. With dry reagents, blood can be collected, stained and fixed at the point of collection before being shipped to a central testing facility at room temperature. After fixing the blood, the blood can be stored for up to 5 days without any difference in reported results. Scientific testing proved the stability of the blood samples up to 5 days. There were several other advantages to dry reagents- it was a unitized test that reduces human error, the shelf life of the reagent is long (>12 months at room temperature), and there was the potential to introduce distributed value addition in sample processing creating opportunity to add economic value at the point of sample collection. The low cost of labour has been leveraged to increase material yield significantly reducing overall costs of production.

Hardware are designed based on work flow requirements and sample aggregation. Most of the designs are typically out of date – cumbersome regulatory procedures remove any incentive to modernize and take advantage of cost reduction opportunities. Starting with a clean slate and unencumbered with legacy problem can present a unique opportunity to redefine the cost equation. Without changing the basic science but designed for India, in India and by Indians can change how the hardware is deployed. The ReaFlo Fluorescence system is an example. The system was made affordable by focusing on creating “value arbitrage” using the cost arbitrage of India. While the bulk antibodies are imported, all the value addition takes place in India – leading to significant cost reduction. Cost arbitrage in India permits robust batch to batch validation, full audit trail and innovative assay delivery pertinent to the local region. The focus is on “owning the problem” of reducing CTC and not on the execution of discrete tasks. The process is not one of new discovery but reformatting and optimization of existing technology to amortize costs better. After making “diagnostic information” affordable one moves towards providing a
panel of information that can lead to “Wellness” management. Economic sustainability and affordability can be driven by cutting down the layers of margin.

One has to look at “diagnostic information generation” holistically, not just as assay reagents and platforms. Economic viability & sustainability have to be part of the design process. The idea is to “import the science” but develop the implementation of the science in the local context and rather than just focusing on cost arbitrage, to use cost arbitrage to generate sustainable value arbitrage.

Holistic sustainable rural transformation models may help address emerging healthcare challenges. A program functioning in 5 districts of the state of Andhra Pradesh in India was presented as an example. 158 villages with a population of 890,000 have been adopted by the scheme with indirect benefits extending to 2,000,000 people from 270 neighbouring villages. The model focuses on delivering sustainable high quality healthcare through an integrated approach that involves communities, the public sector and the private sector. The model provides for primary and secondary care, care for diabetes, hypertension, HIV/AIDS, epilepsy, eye care, dental care, antenatal and child care, school health and cancer detection. The model incorporates a health insurance scheme and telemedicine. The model has established a health centre in each project village, completed a door-to-door survey of respondents, provides for daily visits by qualified physicians with a resident health worker in all centres, provides essential medicines at the health centre and integrates technology solutions to improve efficiency. The model has seen 3.5 million patient visits in 4.5 years, and currently has 60 doctors and 175 health workers. Health care is provided at affordable rates, for example, hypertension assessment costs 10 rupees per person, and blood sugar assessment 15 rupees per test. Access to sanitation has been increased from 40% to 65%. A Grama Vikasa Samiti has been established that comprises 9 members from the village who take responsibility for health, education etc. Communities provide land for the village health centre and take ownership of the centre. Dr Ratna Devi discussed how the program covers a significant population of non communicable diseases without losing sight of the unfinished communicable disease and maternal and child care agenda.
The panel emphasized the burden that non communicable diseases place on the health system. It was emphasized that these are life long commitments and given the increasing longevity of our population, these are likely to be commitments that span decades. The role of education was re-emphasized as something very vital to the success of these programs. The issue of lack of respect for alternative systems of medicine and the unwillingness to co-opt traditional systems of medicine into the mainstream was discussed. The possibility of re-introducing forgotten good habits from history was presented as a possible innovative solution.

Many of the technologies are long past the time where their patent has expired. There are plenty of opportunities to innovate without infringing into someone else's Intellectual Property.
6. Addressing the Challenge of Diabetes Mellitus in India

Key Presentations: a) Dr. V Mohan  
b) Dr. C S Yajnik  
c) Mr. Shrikumar Suryanarayan

Chair: Dr. V Mohan

Diabetes Mellitus is a major public health challenge. India is the diabetes capital of the world. An estimated 40.7 million Indians will have diabetes mellitus by 2007. This is expected to increase to 69.9 million people with diabetes by 2025. The challenge of diabetes epitomizes the burden non communicable diseases will place on the health systems. The balance between development and health is best illustrated by diabetes. A genetic predisposition among Indians was compounded by a rapid shift in lifestyles leading to added environmental risk for diabetes.

The numbers that the health system in India has to deal with is staggering. Changing lifestyles have ensured an increasing prevalence of risk factors for diabetes at younger ages which is translating into younger people more at risk for diabetes. Also people are living longer which translates into more people at risk for diabetes. The longer people live with diabetes, the greater the risks for systemic complications. Given that tertiary care is not exactly blooming in India, this places a terrific strain on a health care system that is already creaking under the burden of existing problems.

Diabetes mellitus is not a single system disease and hence we need more specialists involved with the care. Complications from diabetes and diabetes itself can be prevented by lifestyle modifications. However, health behaviour is not so easily modifiable although it is less cost intensive.

The key question is

a) How do we ensure that health systems in India are not overwhelmed by the diabetes epidemic
The conference heard from Dr V. Mohan from Chennai, Dr C.S Yajnik from Pune and Dr S. Suryanarayan from Bangalore.

The prevalence of diabetes in India has increased by 72.3% over a span of 14 years. In 2000, 8.3 million people had nephropathy from diabetes, 6.8 million people had coronary artery disease, 5.6 million people had retinopathy and neuropathies respectively, and 2.0 million people had peripheral vascular disease. Dr Mohan discussed his model for addressing diabetes in India. The model focuses on integrating preventive, curative, rehabilitation and health promotion aspects with technology support. The model focuses on understanding the burden of disease and risk factors through scientific studies that have resulted in a series of publications pertaining to diabetes from India. The scientific evidence is routed back into the programs for further refinement of interventions. There is a definite genetic predisposition towards diabetes among Asian Indians. Changing lifestyles have added to the already pre-existing genetic predisposition leading to an epidemic of diabetes in India. Compared to persons who were physically active and did not have a family history of diabetes, the risk increased by 2 times if a person was sedentary with no family history of diabetes, by 2.5 times if the person was active but had a family history of diabetes and by 3 times if the person was sedentary and had a family history of diabetes.

Technology can be used at any stage in the natural course of the disease to manage diabetes - from primordial prevention to tertiary care management. At the tertiary level, the focus is on early diagnosis and management of systemic complications of diabetes. Secondary level prevention aims at preventing the onset of complications through diet, exercise, oral medications/insulin and education. Innovative technology solutions can be developed to deliver insulin better. Insulin pumps that program insulin delivery are available and useful but are expensive. Insulin inhalers are becoming available.

Technology developments and innovations need not always be instrument oriented. An Indian Diabetes Risk Score has been developed using epidemiological data that provides a non invasive tool as a first line screening to identify persons at risk for
diabetes. The score provides cut off values for determining the risk for diabetes. It is important to note that the score can be reduced by reducing waist circumference and increasing physical activity. The key component in the battle against diabetes is lifestyle modification.

Knowledge from research in diabetes has to be translated to the community for better results. The actual prevalence of diabetes in terms of percentages maybe higher in urban areas, however, the absolute number of people with diabetes is higher in rural areas. Diabetes in India is no longer an urban problem. Controlling diabetes needs education and health promotion, screening for diabetes, and appropriate management. Training for human resources, and technology solutions like telemedicine may be needed to supplement ongoing efforts.

Waist maybe a better predictor for diabetes than hip measurements especially in screening programs focused on detection of early diabetes. There is a need to scientifically evaluate the merits of alternative therapies for diabetes. A community randomized trial is currently going on to evaluate the effects of walking and yoga (in combination and separately) on diabetes care.

There is increasing evidence for the early life developmental origins of diabetes. The paradigm has to shift from obesity (body mass index) to adiposity (body fat %). The percentage fat at birth among mammals is highest among humans. Baker’s hypothesis of foetal under nutrition and the implications of foetal under nutrition may hold good for diabetes. There are intergenerational connections of insulin resistance and it is associated with parental height and weight and height of the offspring. Children of short stature parents were more at risk for developing diabetes. Interestingly, tall children of short stature parents were also at increased risk suggesting the role of foetal or developmental adaptation stressors in the development of diabetes. Foetal nutrition and growth is a factor of maternal nutrition. Maternal nutrition, by itself, is influenced by several factors. Thus, approaches to deal with the increasing epidemic of diabetes have to start early in the lifecycle. Research shows that ‘thinner’ Indian babies (based on birth weight) actually had more percentage body fat compared to ‘heavier’ (based on birth weight) Caucasian babies
of the same age. Birth weight of offspring was associated in a positive direction with maternal consumption of green leafy vegetables, fruits and milk. There is an association of folate with foetal nutrition and folate consumption is related to current food practices and practices surrounding folate supplementation. There is a potential role of epigenetics (heritable changes in gene expression or function that occurs without a change in the DNA sequence) in development of insulin resistance.

There are several advances in insulin delivery. Insulin is a protein molecule and is digested easily when delivered orally. Also, being much larger than oral antidiabetic agents (MW ~6000 compared to <500 for oral antidiabetic agents) it cannot be absorbed easily from the digestive tract. Therefore it has been conventionally delivered by injection. Injectables have their own potential for side effects. Considering that insulin use is chronic in nature, an injectable approach is not necessarily exciting or inspiring enough for the patient to remain compliant. Several alternative delivery modes for insulin are now available including pens, and insulin pumps. The insulin pump contains a reservoir of insulin and a computer controlled syringe pump that delivers appropriate amounts of insulin to hold the blood sugar levels steady. There are benefits to early initiation of insulin therapy, however, issues related with daily injection of insulin or high device costs are a significant impediment to early insulinization. Alternative approaches being worked at for the delivery of insulin include buccal, nasal, inhaled, patch, oral and other approaches. Oral insulin passes through the stomach and is absorbed in the small intestine. Insulin is delivered via the portal vein to the liver. The majority of the insulin is used by the liver. Excess insulin is delivered to the periphery.

Animal insulin was being extracted in India from bovine and other sources. Animal insulins can cause immune reactions - besides potential safety issues related to BSE, pathogenic viruses etc. Human insulin is a product of recombinant DNA technology. Insulin is produced in a genetically engineered microbial strain. It was first manufactured in India only about 3.5 years ago. Till then, all human insulin used was imported. Now, Biocon is the largest Asian manufacturer (and exporter) of recombinant human insulin. Indigenous manufacture led to price drops in the Indian
market. Prices of insulin reduced approximately 2.5 fold upon introduction of biosimilar insulin. Price of injectable insulin is now $6.75 per 1000 IU in India (USA: $32 per 1000 IU). Indigenous Pen devices have also begun to become available. Indigenous Pump devices are under development.

Low cost insulin availability is the key to the Indian diabetes context. Injections will continue to remain the most affordable method for insulin administration for time to come. Lower cost injection devices like pens and pumps will also become available in the near future in India. Non-invasive insulin delivery is a reality; this includes inhaled, buccal and in future probably oral routes. These technologies will have to mature considerably to be price competitive with injectable insulins. Alternatively, higher price will be balanced by superior medical benefits or patient acceptance.
7. Addressing the Challenge of Diabetes Mellitus in India – Managing Systemic Manifestations

Key Presentation: a) Dr. Sameer Shrivastava  
   b) Dr. Rajiv Raman  
   c) Dr. Arun Bal

Chair: Dr. K Srinath Reddy

Dr A. Bal from Mumbai, Dr R. Raman from Chennai and Dr. S. Shrivastava from Delhi discussed how various systemic manifestations of diabetes may be prevented and managed.

The steady increase in mortality from diabetes is a matter of concern. 68% of persons with diabetes do not consider cardiovascular disease to be a complication of diabetes, over 50% of persons with diabetes do not feel they are at risk for heart condition or stroke, and 60% of persons with diabetes do not feel at risk for high blood pressure or cholesterol. Awareness is lowest among those most at risk for complications from diabetes especially the elderly and disadvantaged populations. There is a relation between free fatty acids, insulin resistance, and hyperglycaemia and the different mediators leading to oxidative stress and vasoconstriction, inflammation and thrombosis. A predisposition for early disease, late presentation and higher prevalence of co-morbidities was hypothesized as a potential reason for the increasing mortality from diabetes. More than 65% of all deaths in people with diabetes are caused by cardiovascular disease. Heart attacks occur at an earlier age in people with diabetes and often result in premature death. By 40 yrs of age CHD is leading cause of death in diabetics. The rates of CHD are 2-3 times higher in men with diabetes & 3-7 times higher in women with diabetes. Data demonstrating reduced risk of CHD with tight glycaemia control are scant. A diabetic without a prior MI is equivalent in risk to a non diabetic with an MI. The risk for CHD and death from CHD increased with the duration of diabetes. Coronary artery disease is more severe in persons with diabetes. Multi-vessel involvement is more common, there is a more diffuse distribution of CAD, and left main disease is more common, angiographically
small coronaries with incomplete revascularization and poorer coronary collateral formation complete the picture. Persons with diabetes have increased post myocardial infarction mortality, increased recurrent cardiovascular events, increased risk of sudden cardiac death and increased risk of CHF and cardiogenic shock.

Up to 60% of adults with diabetes have high blood pressure. Nearly all adults with diabetes have one or more cholesterol problems, such as: high triglycerides, low HDL (“good”) cholesterol, and/or high LDL (“bad”) cholesterol. The Prospective Cardiovascular Münster Study (PROCAM) showed that rates of myocardial infarction (MI) over a 4-year follow-up period in a group of middle-aged men were increased nearly three times in people with diabetes compared with no diabetes. When diabetes mellitus and hypertension occurred together, the incidence of MI was eight-fold greater than in subjects without any risk factors. If dyslipidaemia was also present, a further two-fold increase in risk was observed. These data confirm both the independent risk associated with diabetes mellitus and the synergistic interaction that diabetes has with other common risk factors for coronary heart disease (Assmann G, Schulte H. Am Heart J 1988; 116:1713–1724). The role of CABG and PCI in the management of CAD was discussed. Several ways for early detection of CAD was mentioned including Carotid Intima-Media Thickness, Brachial Artery FMD for endothelial function, Ankle Brachial Index, Pulse Wave Velocity, Coronary Calcium Score/CT coronary angio, Cardiovascular MRI and hsCRP. Strict control of blood pressure will reduce incidence of complications. It was suggested that the target LDL level should be less than 100 mg%. Modifiable risk factors need to address aggressively to reduce cardiovascular mortality and complications among persons with diabetes. Women with diabetes are at 50% increased risk of death from fatal CHD causes compared to diabetic men. There are several issues that need to be considered for optimal control of cardiovascular complications of diabetes. These include the burden of cardiac diseases in rural areas, cardiac diseases in women, CAD in young, undetected rheumatic heart disease, lack of diagnostic facilities, financial constraints limiting optimum treatment and lack of health awareness.

The involvement of the foot in diabetes is often underestimated. 15% of patients with diabetes will develop diabetic foot lesions and 1% will require limb amputation.
Every hospitalization costs 25 to 30 thousand Indian Rupees. 50% of the non traumatic amputations are due to diabetes; 85% of these amputations are due to untreated and/or inadequately treated diabetic foot ulcers. 60% indoor admissions are due to the foot infections. Majority of diabetic foot ulcers in India are neuropathic infective and 15% lesions have associated vasculopathy. Amputations are not necessarily an answer. Peri-Operative mortality is 10%, 30% of amputees die within 1 year, 50% of amputees die within 3 years and 50% of amputees undergo contra lateral amputation within 5 years.

There are several causes for diabetic foot including a loss of protective pain sensation, weakness of foot muscles, loss of joint position sense, changes in bones & joints of foot causes deformities, and development of high pressure areas on plantar aspect. Unprotected & uncontrolled walking in the presence of non enzymatic glycation leads to damage to foot structures.

Diabetic foot ulcer is a mechanical problem & no amount of antibiotics/dressings will heal the ulcer unless the pressure is reduced. Currently, 40,000 lower extremity amputations are performed per year. The Commonest indication is an infected neuropathic foot that is potentially preventable.

Care of the diabetic foot needs trained personnel. Unfortunately diabetic foot does not merit attention in the current medical curriculum. Diabetes Foot Society of India (DFSI) has taken the initiative to train 600 doctors in the past 5 years. Diabetic foot care needs new strategies to de-medicalize diabetic foot screening and care involving mainly paramedics and community health workers in the process of care. Regular screening/monitoring is essential at primary healthcare level with availability of technological inputs like monofilament & biosthesiometer. Simple and universal footwear has to be made available at health centres. Referral services are needed for complicated diabetic foot cases. Patient education material & self care and self help group training manuals are necessary. Comprehensive diabetic foot care clinics at every district hospital, technology input like foot pressure measurement and availability of surgical facilities and standard and advanced footwear facilities are necessary at the secondary level. At the tertiary level, regional referral centres at
division level (group of 5 districts), facilities for vascular investigations and treatment, facilities for prosthetics and advanced footwear, and lower limb amputation registry at tertiary healthcare level, and training of doctors for surgical treatment of diabetic foot is essential.

Diabetes has several complications in the eye with a potential to lead to blindness. Nearly 30% of persons with diabetes may have a retinal lesion related to diabetes; approximately 10% of persons may have severe complications in the eye that may lead to blindness. The most common complication in the eye is a diabetic retinopathy that is preventable. Severe forms of diabetic retinopathy maybe managed through surgical or laser interventions.

The burden of eye complications especially diabetic retinopathy can be addressed effectively by early detection and intervention. Early detection of diabetic retinopathy is possible through retinal imaging techniques; however, the reach of these technologies into rural India is still sub optimal. A model for detection of diabetic retinopathy in rural hinterlands was discussed involving telemedicine and satellite transmission of images. The screening was conducted by trained ophthalmic paramedical personnel including optometrists using a well equipped mobile van. The retinal images were captured using non mydriatic fundus cameras and were transferred via satellite to the specialists for opinion. Subjects who need further intervention were advised follow up at the base hospital. The model has been cost effective in screening for diabetic retinopathy; however, several elements of cost and lead time can be reduced further through technological innovations. Indigenous low cost retinal imaging systems, and software that will help read the images real time will help reduce costs and lead time.

The panel emphasized the need for an integrated approach extending from prevention to rehabilitation in addressing the emerging health challenges of the NCDs. The implication of the role of multiple factors in the development of NCDs is enough evidence to address the NCDs through an integrated approach. The measures to address these challenges is a combination of education for awareness generation, policy related measure and inculcated healthy living habits. An integrated
approach should allow for earlier detection, self referrals, measures for opportunistic
disease screening and minimise missed opportunities for detection as and where possible. The role of integrated management like treating hypertension with diabetes mellitus is more effective and complements each other. There is need for more institutions and resources to carry out operational and action research in the field of NCDs.
8. Financing Healthcare Delivery

Key Presentations: a) Dr. Amarjit Singh  
             b) Mr. N.S. Kannan  
             c) Mr. Pranav Prashad  
             d) Dr. Akash Acharya  

Chair: Dr. Nachiket Mor

The public sector often carries the burden of providing health for the poor especially in resource poor countries. Often, the services do not reach the poor. The cause for the failure of the public sector to reach the poor can often be traced back to the way the public sector spends money. Public sector expenditure management is a tough ask especially when accountability is weak. If the public sector spends more than it can sustain, services deteriorate. Public sector expenditure will exceed available funds in the absence of transparent systems to resolve competing claims of politicians, policy makers, ministries and regional governments. The resulting unsustainable fiscal deficits lead to tightening of expenditures. Unfortunately, it is usually basic services that get trapped within the drive to reduce expenditure.

The key question is: How should funds be allocated to improve health outcomes? How do we ensure that these funds are utilized appropriately for the purpose they were meant for?

Several issues have to be considered. A) Are there market failures due to public goods or externalities? B) Is redistribution for equity the goal? C) What is the appropriate instrument- reform of public provision or financing, regulation or educating the public? D) What are the fiscal costs over time and how do the expected benefits compare with those for expenditures on other things that governments should consider financing?

It has to be kept in mind that expenses can overlap between sectors- reduction in infant mortality rates has much to do with how expenses for clean water and
education (especially female literacy) are managed simultaneous to health focused expenses.

Focusing on market failures alone presumes that government implementation programs are inconsequential. Where government failures outweigh market failures, ignoring them can lead to large public expenditures that benefit mainly the non-poor or to services so defective that their opportunity costs outweigh the benefits. In the health sector, if the primary health sector lack professional staff and medicines, and if the political environment is not pro poor, public provision or even subsidies for private provision may not work effectively. Ignoring the private response to public expenditures can also result in ineffective public expenditures.

Questions about rationale and instruments cannot be answered without detailed information about the sector, the nature and depth of the market and government failures, who benefits and private responses to public expenditures.

The conference heard from several subject experts including Dr. Amarjit Singh, Mr. N S Kannan, Mr. Pranav Prashad and Dr. Akash Acharya.

Worldwide, every minute, 380 women become pregnant, 190 women face unplanned or unwanted pregnancy, 110 women experience a pregnancy related complication, 40 women have unsafe abortions, and 1 woman dies from a pregnancy-related complication. The highest burden of maternal death (25.7%) is in India. This burden is inequitably distributed regional differences; however, the poor have the maximum burden. The NFHS reports that maternal mortality rates have reduced in urban India over a decade but actually increased in rural India over the corresponding period. The lifetime risk for maternal death is 1 in 140 for South East Asia compared to 1 in 2800 for the developed countries. Approximately 75% of deliveries among the richest in India are attended by qualified personnel as compared to less than 20% for the poor. Nearly 60% of maternal deaths occur postpartum, and nearly one fourth of deaths can be attributed to haemorrhage. The time from onset of complication to death ranged from 2 hours to 1 week. There appears to be a relationship between having skilled attendants at childbirth and a
reduction in maternal mortality. So far, it appears to be the most effective intervention. 73.3% of babies die within the first week of delivery. Neonatal mortality also shows an association with skilled attendance at birth.

Once major obstetric complication develops- even a trained TBA or a nurse cannot do much at home. These complications require surgical interventions, injections of antibiotic, blood transfusion and other aggressive treatments. There are three major delays that contribute to maternal death a) Delay in deciding to seek care (Individual & family), b) Delay in reaching care (Community & System), and c) Delay in receiving care (System).

There are several options that maybe considered. A) Improve Government Health Service with competent staff, adequate infrastructural facilities and user friendly, good quality competitive services and marketing of services, B) Public Private Partnership including outsourcing of curative services and C) Health Insurance. A public private partnership model (Chiranjivi) in the state of Gujarat in India was discussed. The costing in the model and the reimbursement mechanism (developed based on evidence from the field) was discussed. The program has been able to reach 28% of the below poverty line population in the 5 districts it has been implemented in. An important learning from this model has been the willingness of the private sector to partner with the public sector if roles and responsibilities are well defined. 168 of the 217 specialists in the 5 districts registered to help with the program, and conducted 32,066 deliveries (an average of 191 deliveries per doctor). Only 4.9% of deliveries were through a caesarean section. There was a net positive change in the percentage of institutional deliveries ranging from 5 to 28%. The program costs about 10.5 crore rupees to roll out in the five districts.

The expenditure on health (especially hospitalization) is often unexpected and can be catastrophic in nature (NSS 52nd round results). In India, where state spends less than 1% of GDP on health, most health expenditure is private out-of-pocket; such out of pocket based health care financing system cuts the household budget of the poor besides the additional indirect costs associated with hospitalization episode. More than 40% of hospitalized Indians borrow money or sell assets (WB 2002). More than
30% of hospitalized Indians fall below the poverty line (IHR 2003). The safety net of health insurance present in developed countries is often not there, existing health insurance schemes are skewed in favour of non-poor in organised sector. The vast majority in the unorganized/informal sector remains vulnerable. When State as well as Market has failed, some NGOs are trying to protect the poor through Micro Health Insurance (MHI). MHI schemes are not-for-profit targeting the poor with community participation in scheme design and management, usually NGO managed, low premium-low benefit schemes. There are about 15 MHI in India and three primary models a) provider owned models, b) NGO owned models and c) NGO mediated models. The schemes are diverse in nature but pre-payment is a common thread. The enrolment unit varies a) individual, b) household c) SHG or d) entire village with adverse selection a common theme. The premium and benefits too vary between schemes. There are several issues with MHI and other schemes including the difficulty of the concept for the poor, low awareness levels (membership and exclusions) and low coverage, non-financial barriers, utilisation barriers, poorest of the poor, regressive premium, skewed utilisation (Equity Impact) and supply side moral hazard. Other issues include the high out of pocket expenses, the care that is accessible, financial sustainability, and the dearth of empirical database (documenting new scheme, analysing access and protection)

The bottom quintile, poorest 20% of the population spends a larger part of their income on healthcare which is more than 12% whereas the top quintile spends approximately 3%. There are several issues with health care in India that often result in no choice treatment including

a) Customer attitude- often see a doctor only when it is absolutely unavoidable
b) Providers- quality a major concern, care unilaterally decided by the doctor
c) Outcomes
d) Cost of treatment, loss of income, travel expenses, indirect expenses related to healthcare still too high most often causing indebtedness

The current loss ratios for MHI are unacceptable with the MHI having a high risk profile with a lack of demand or profitability. Rural health insurance has to be viewed as a commercial business opportunity with the key themes being product innovation
and cost effective distribution and administration. There are several benefit packages possible such as an indemnity, benefit payout and comprehensive covers. A combination of public private providers will be ideal as each sector has its own limitations and advantages. The public sector is large, especially in rural areas, is regulated, but has inconsistent quality, lack trained manpower, is understaffed with no effective management, is underutilized, patients are turned back, yet is trustworthy and used by 30% of the population. The private sector is numerous but is fragmented and not regulated with variation in quality, qualified manpower is not always guaranteed, better managed most often, significant variation in quantity of diagnosis & treatment exists, yet is used by 70% of people.

The distribution can be through aggregators, through a retail process or through the government itself. The methods of financing may include voluntary contributions, bundled with credit or wage deductions, or subsidies or grants.

The Arogya Rakshana Yojana partnering with Biocon & Narayan Hrudalaya in rural Karnataka was presented as an example. 60,000 lives in Anekal Taluka in Karnataka are provided cover for all kinds of common and complex surgeries and medical admission with co-payment for medical admission, drugs & diagnostics at discounted price, free outpatient consultation and preventive and promotive activities. Partnership provider models also exist with the Apollo and Manipal group of hospitals, Dharamsthala Trust, Microfinance institutions.

Several key learning include the need to have credible channels, predefined groups that minimize anti selection and moral hazard, the need for awareness building and education, the need to name and provide photo ID cards to all beneficiaries at enrolment and online access to data at the time of authorization and verifications by local staff.

In developing countries, an ageing population is leading to rising health care costs. While advanced technology helps provide better care, it comes at a higher cost. The patient bears no/limited cost - no effort to promote cost awareness which leads to over-utilisation of scarce resources. On the other hand, social values influencing
definition of health and leading to wider definition of coverage such that spend could reach more than a third of GDP in next two decades.

Singapore was explored as a potential role model for health financing. Singapore ranked 6th in terms of effectiveness (World Health Report, 2000) amongst 191 member countries. While in terms of health expenditure per capita it ranked 38th, Singapore spends 3.8% of GDP on health compared to 15.3% spend by US and 7.7% spend by UK. The principles used in Singapore model include a) Health is the personal responsibility of the individual b) Mandatory savings scheme c) Funding is based on co-payment scheme that keeps basic health care affordable.

There is an increasing incidence of life style diseases like diabetes, cancer and heart disease due to rising affluence & urbanization. Cancer and Heart disease likely to constitute 37% of inpatient spends by 2012 compared to 27% in 2001. Critical Illness is impacting people at younger ages-30% of heart attack patients are below 40 years. The chance of being diagnosed with the 3 Critical Illness in a particular year is about 3 times the chance of dying. Lifestyle diseases can be managed. Technological advancements enable preventive care and better chronic management with easier & more reliable monitoring tools and predictive testing. There is an opportunity to leapfrog the health spend evolution cycle, by moving directly to prevention-based approach. The way forward is to invest in customer education & provide them financial incentives to manage health costs, focus on pro-active management of health through regular preventive care & diagnosis, pattern recognition to assess likelihood of complications, evidence-based treatment of complications. This may enable us allow larger financing through efficient use of resources, achieve risk pooling and achieve overall cost reduction through preventive care and early detection to reduce incidence of disease and cost of treatment.
9. The ICICI Centre for Technologies in Public Health

Panel: Mr. N Vaghul, Dr. Nachiket Mor, Dr. Bala S Manian, Ms. Deepanwita Chattopadhyay

The direction of the proposed new centre was presented. The ICICI Centre for Technologies in Public Health (ICTPH) is planned as a research centre that aims at contributing to improvement of the health of poor populations by focusing on designing, developing and delivering innovative solutions in healthcare concerning India and the developing world. This would be done through an inclusive process that scientifically integrates knowledge of factors influencing health and diseases in India, regular evaluation and impact assessment of existing health systems and integration of appropriate technology for optimal health care delivery. ICTPH will adapt and translate learning from these experiences to other developing countries. The key objectives of the centre are to a) design and implement surveys of health care systems and health care technology gaps through field sites in 4 to 5 identified districts or clusters in India and develop recommendations for better health care delivery strategy b) to evaluate existing service delivery models for replication, c) to design and implement an impact assessment study of existing technologies, and d) to design innovative technology and health systems research in collaboration with Centres of Excellence. The activity plan for the centre for the next five years was presented to the audience for comments.

The need for information collection and dissemination technologies that can be optimally deployed, the concern regarding monopoly of information by the medical profession and the need to demystify information but with quality assurance, and to develop outcome monitoring measures, and the need to take the basic science and indigenize the technologies in a way that allows delivery of quality health care and the need for a holistic view of health care was re-emphasized.

The complementary role of the Public Health Foundation of India was presented by Dr. Srinath Reddy who explained the focus of PHFI on human resource development and research. The aim is to establish 7 institutes of PHFI in India, providing Masters
level, diploma level, and 3 year BSc programs in public health. PHFI will be a center of excellence developing a network of researchers, international partners, policy development, reaching civil society and governments, setting standards and accreditation mechanisms. Dr Reddy emphasized that “Science discovers, technology develops, public health delivers” and the role of collaboration between PHFI and ICTPH are on an even keel and complementary to each other.

The need for coordinates between development and dissemination was emphasized. Several areas of priority were emphasized including urban health issues, diabetes mellitus, the need for a life cycle approach, and traditional systems of medicine.

It was suggested that the financial expertise within the ICICI Group can be used effectively to find solutions to public health problems- either as financial solutions for delivery of care or funding of public health programs. The public health scenario in India can be overwhelming and there is a possibility of the focus becoming diluted. It was clarified that ICICI Knowledge Park (IKP) evolved to generate knowledge and has now recognition as a centre for life science research. IKP has its own board and is autonomous of the ICICI Bank. The proposed new centre will function within the IKP but autonomous of the IKP and ICICI bank.
### DAY 1 – December 19, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8.45 AM Onwards</td>
<td>Registration</td>
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<tr>
<td>9.15-11.15 AM</td>
<td>Inaugural Session</td>
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<tr>
<td>9.15-9.20 AM</td>
<td>Welcome Address</td>
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<tr>
<td>9.20-9.30 AM</td>
<td>Overview of IKMC2006</td>
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<tr>
<td>9.30-10.00 AM</td>
<td>Keynote Address – Global Perspective</td>
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<tr>
<td>10.00-10.30 AM</td>
<td>Keynote Address – Indian Perspective</td>
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<tr>
<td>10.30-11.15 AM</td>
<td>Panel Discussion</td>
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<td>11.15-11.45 AM</td>
<td>BREAK FOR CONTACTS</td>
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<tr>
<td>11.45 AM–1.30 PM</td>
<td>Session 2</td>
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<tr>
<td>11.45 AM-12.05 PM</td>
<td>Public Health Interventions - Models &amp; Issues in Healthcare Delivery</td>
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<td>12.05-12.25 PM</td>
<td>Making cardiovascular care accessible</td>
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<td>12.25-12.45 PM</td>
<td>Evolution and impact of indigenous intraocular lenses</td>
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<td>12.45-1.00 PM</td>
<td>National perspectives for localized solutions</td>
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<tr>
<td>1.00-1.30 PM</td>
<td>Panel discussion</td>
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<td>1.30-2.30 PM</td>
<td>LUNCH</td>
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| Session 3 | 2.30 – 4.00 PM | Improving Rural Health in India  
Chair- Prasanna Hota, Former Secretary, Health & Family Welfare, GoI |
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<td>2.30-2.50 PM</td>
<td>Improving health in rural India</td>
<td>Prasanna Hota, Former Secretary, Health &amp; Family Welfare, GoI</td>
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<td>2.50-3.10 PM</td>
<td>Technology solutions for infectious diseases</td>
<td>Yogesh Jain, Founding Member, Jan Swastha Sahyog, Bilaspur</td>
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<td>3.10-3.30 PM</td>
<td>Issues governing technology development for rural areas</td>
<td>Nerges Mistry, Director, Foundation for Medical Research, Mumbai</td>
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<td>3.30-4.00 PM</td>
<td>Panel discussion</td>
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<td>4.00-4.30 PM</td>
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| Session 4 | 4.30–5.45 PM | Emerging Healthcare Challenges  
Chair- Bala S Manian, Founder, Reametrix Inc., CA & Bangalore |
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<td>4.30-4.50 PM</td>
<td>Innovation in diagnostics</td>
<td>Bala S Manian, Founder, Reametrix Inc.</td>
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<td>4.50-5.10 PM</td>
<td>Innovation in healthcare delivery</td>
<td>Ratna Devi, Byrraju Foundation, Hyderabad</td>
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<tr>
<td>5.10-5.45 PM</td>
<td>Panel discussion</td>
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<td>7.00-9.30 PM</td>
<td>Networking Dinner</td>
<td>Host: Mr. N. Vaghul, Chairman, ICICI Bank</td>
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**DAY 2 – December 20, 2006**

| Session 5 | 9.30-11.00 AM | Addressing the Challenge of Diabetes Mellitus in India  
Chair- V Mohan, Chairman & Chief Diabetologist, Dr. Mohan’s Diabetes Specialities Centre, Chennai |
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<tr>
<td>9.30 -9.50 AM</td>
<td>Using technology to control the epidemic of diabetes in India</td>
<td>V Mohan, Chairman &amp; Chief Diabetologist, MDSC, Chennai</td>
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<td>9.50-10.10 AM</td>
<td>Basic research on diabetes mellitus in India - translation to diagnostics</td>
<td>C S Yajnik, Director, Diabetes Unit, KEM Hospital Research Center, Pune</td>
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<td>10.10-10.30 AM</td>
<td>Advances in Drug delivery for diabetes mellitus</td>
<td>Shrikumar Suryanarayan, President, R&amp;D, Biocon, Bangalore</td>
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<td>10.30-11.00 AM</td>
<td>Panel Discussion</td>
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<td>11.00-11.30 AM</td>
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### Session 6
11.30 AM-1.00 PM
**Diabetes – Managing Systemic Manifestations**
Chair- K. Srinath Reddy, President, Public Health Foundation of India & Prof of Cardiology, AIIMS, New Delhi

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<th>Time</th>
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<tr>
<td>11.30-11.50 AM</td>
<td>Managing diabetic retinopathy</td>
<td>Rajiv Raman, In-charge, Diabetic Retinopathy Project &amp; Consultant, Vitreoretinal Services, Sankara Nethralaya, Chennai</td>
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<tr>
<td>11.50 AM-12.10 PM</td>
<td>Managing diabetic foot</td>
<td>Arun Bal, President, Diabetic Foot Society of India, Mumbai</td>
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<td>12.10-12.30 PM</td>
<td>Perspective on cardiovascular complication management</td>
<td>Sameer Shrivastava, Senior Consultant Cardiologist, Escorts Heart Institute &amp; Research Centre, New Delhi</td>
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<td>12.30-1.00 PM</td>
<td>Panel Discussion</td>
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1.00-1.45 PM
**LUNCH**

### Session 7
1.45-3.00 PM
**Financing Healthcare Delivery**
Chair- Nachiket Mor, DMD, ICICI Bank & Director, ICICI Knowledge Park

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.45-2.05 PM</td>
<td>Financing Comprehensive Healthcare Delivery</td>
<td>Amarjit Singh, Commissioner of Health, Govt. of Gujarat</td>
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<tr>
<td>2.05-3.00 PM</td>
<td>Panel Discussion</td>
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</tr>
</tbody>
</table>

### Session 8
3.00-4.00 PM
**Concluding Session: Way Forward**
Chair- N Vaghul, Chairman, ICICI Bank & ICICI Knowledge Park

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00-3.20 PM</td>
<td>ICICI Centre for Technologies in Public Health</td>
<td>Nachiket Mor , DMD, ICICI Bank &amp; Director, ICICI Knowledge Park</td>
</tr>
<tr>
<td>3.20-3.50 PM</td>
<td>Q&amp;A</td>
<td>N. Vaghul, Nachiket Mor, Bala S. Manian, Deepanwita Chattopadhyay</td>
</tr>
<tr>
<td>3.50-4.00 PM</td>
<td>Concluding Remarks</td>
<td>N Vaghul</td>
</tr>
<tr>
<td>4.00 PM</td>
<td>REFRESHMENTS</td>
<td></td>
</tr>
</tbody>
</table>