Technology for Public Health Development

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Until technologies reach people through public health or other sectoral agencies, they will not be addressing the basic needs of the people for whom they are meant. In developing technologies, the initial phases may not often address a priority, but they always address a need. In order for developing technologies to be effective, there should be a strong information base which provides applied research institutions, pharmaceutical manufacturers, vaccine agencies, and the government enough data to translate the technologies into policies and products that could ultimately be integrated into the health care delivery system. For such matrices to be successful, we need an integrated approach toward fulfilling stakeholders' needs based on disease burden, mortality figures, and economic impact.

In many cases technologies have been translated to public health gains. One of the important areas was oral rehydration fluid, where the glucose transporter based sodium absorption leads to water absorption, reducing diarrhea associated morbidity and mortality. This applied research was translated into a product delivered in a manner where the fluid was accepted by the masses as a drug. Another opportunity for translating technology into an important public health measure is in the area of molecular epidemiology. This technology has enabled scientists to identify 0139 Bengal, adult rotavirus infection and a new K3:06 strain of V. parachemolyticus in India. Similarly, using these tools the nipa virus and the Hong Kong influenza virus were identified in time to avert morbidity and high mortality rates among the population.

The ability to define clades of HIV I through subtyping of HIV I viruses is leading to vaccine generation, thus emphasizing the role of technology in preventing diseases like AIDS.

The past few decades have seen the development of a number of molecular biology techniques, which are now being put to use in daily life for the benefit of mankind. For example, molecular sequencing has enabled the generation of molecular databases of different organisms. Sequencing of polioviruses isolated from different parts of the country, has shown that during the early 1990's multiple lineages were found in Mumbai. Most of these lineages were eliminated from circulation by 1996 through intensive vaccination programs. Reduction of the number of lineages of wild polio viruses was a definite sign of the success of polio eradication efforts. The molecular sequencing database is now used to track transmission routes of wild polio viruses in India and neighboring countries.

Another major technological breakthrough was the ELISA test. It has had a significant impact in ensuring distribution of safe blood through Hepatitis B and HIV screening. ELISA has also been put to use in surveillance studies on various other diseases. The simplicity of the test allows it to be carried out even at the district level. Although some sophisticated reagents and equipment are required to carry out this test, it still has made tremendous impact on public health.

Variations of this technology are being developed to ensure safe water and food supplies. Use of technology for this purpose in developing countries will have a large impact on public health.

A strip test called H2s strip test is currently used to check if water is contaminated with sewage. This strip turns black on contact with contaminated water. The simplicity of the procedure enables it to be used extensively.

Sometimes the application of simple technologies is useful in resolving major public health problems. The introduction of iodized salt has resulted in a

considerable decrease in the cases of goitre. Similar innovations in double fortified salts iron and iodine are expected to aid in the reduction of anemia as well as goitre.

Epidemics like malaria and dengue have always been a matter of concern for health authorities. Predicting such events can always help the authorities to be better equipped to deal with emergencies. Geographical Information System (GIS) using the knowledge of vector biology, mathematical modelling and space research have derived a model which will enable epidemiologists to forecast vector borne diseases. This could be a potential future tool, which will benefit public health in the years to come.

The first recombinant DNA product, which directly benefited public health, was the Hepatitis B vaccine. This vaccine has helped immensely not only in reducing Hepatitis B virus infection but also liver cancer. It is now planned to introduce this vaccine in EPI in India. In Taiwan and Japan a similar program has yielded very good results. A new recombinant cholera vaccine developed in India might also go to the public health system if phase II and field trials are found successful.

Sophisticated laboratory technologies have also been used in disaster management in India. During the plague, a major controversy as to whether the breakout in Surat was mellidiosis or Y. pestis infection was resolved using PCR technology. The technique was used for identifying PLA and FI genes. The bug was identified in cultures as well as autopsies through finger printing. The results showed that it had clonal origin and thus a major initiative on plague containment and surveillance could be launched.

The development of newer environment monitoring tools has made monitoring the lead and pesticide overload in the cities possible. Due to this technology, the arsenic poisoning that happened in West Bengal could be detected and timely public health measures could be instituted.

There is an upsurge in new technologies addressing both communicable and non-communicable diseases. However, using these technologies for the good of public health requires political will and the strong informatic system of a group that addresses priorities and translates technologies to public health utility. To achieve these targets, task forces might be needed to institute continuous auditing of the process.