



# International Journal of Indian Medicine

[www.ijim.co.in](http://www.ijim.co.in)

**ISSN: 2582-7634**

**Volume - 4, Issue - 3**

**March 2023**



# IJIM

INDEXED



# International Journal of Indian Medicine

Access the article online



International Category Code (ICC): ICC-1702

International Journal Address (IJA): IJA.ZONE/258276217634

## An appraisal on Cost effectiveness and outcome of Diseases preventive programs across India.

**Wankhede D.P., Tayade S.S.**

1. MBA(Marketing), MA(Economics), LLB, PhD Sch. KBCNMU Jalgaon, Maharashtra.
2. BSc-Biotech, BAMS, MPH, NCD-Program Coordinator Jalgaon Civil Hospital, Maharashtra.

### Abstract:

Cost-effectiveness analysis combines information about the costs and outcomes of a community prevention program to produce information that can be used to answer questions about whether a program is cost-effective, whether program expansions would be cost-effective, and/or whether a program is more or less cost-effective than alternative prevention strategies. A cost-effectiveness ratio is calculated by dividing the net cost by variations in health outcomes. Examples include the price each sickness case that is averted or the price per life lost. However, the outcomes are presented as net cost savings if the net costs are negative (meaning a more effective intervention is less expensive). Target interventions also should address disease conditions that are major sources of infant and childhood mortality and infectious disease burdens, to better address the needs of those who are underserved by the current system. Currently, decisions about which health care services to cover are typically made by expert committees rather than through systematic assessments of efficacy and cost-effectiveness, in part because the evidence base on economic evaluations of health interventions in India remains sparse and of low quality. However, in recent years, the government has taken several steps towards establishing the infrastructure for evidence-based priority setting and resource allocation. India has great potential for improving the health of its people at relatively low cost.

**Key Words:** interventions, diseases, cost-effectiveness, public programs

### Corresponding Author:

**Dr. Swapnaja Shubhakar Tayade**

BSc-Biotech, BAMS, MPH,

NCD-Program Coordinator Jalgaon Civil Hospital)

Email ID- shubhsandhya123@gmail.com



**How to cite this article:** Tayade S.S., Wankhede D.P. An appraisal on Cost effectiveness and outcome of Diseases preventive programs across India. Int J Ind Med 2023;4(3):36-44

**Introduction:**

In order to achieve universal health coverage, India has expanded government health programs over the last two decades, most notably with the establishment of the National Health Mission and the implementation of public health insurance programs aimed at low-income households [1]. However, national health spending remains among the lowest in the world. As the government increasingly assumes the role of purchaser of health care, decisions about the allocation of scarce health resources will have significant fiscal and health consequences and must be evidence-based. Furthermore, in order to control costs and address the growing chronic disease burden effectively, public programs will need to find ways to integrate curative hospital services with the most cost-effective preventive and primary interventions. Currently, decisions about which health care services to cover are typically made by expert committees rather than through systematic assessments of efficacy and cost-effectiveness, in part because the evidence base on economic evaluations of health interventions in India remains sparse and of low quality [2]. However, in recent years, the government has taken several steps towards establishing the infrastructure for evidence-based priority setting and resource allocation

[3], including the establishment of a body for Health Technology Assessment in India within the Department of Health Research to collate and generate evidence on the clinical efficacy and cost-effectiveness of new and existing health technologies and programs [4]. There will be research evidence on the cost-effectiveness of both preventive and curative health interventions in the Indian context.

India is undergoing an epidemiological and demographic transition, which has been facilitated in part by sustained economic development, which has increased incomes and reduced poverty. Male life expectancy has increased by more than 30 years in the last half-century. Infant mortality has decreased nationwide over the last decade, with some states experiencing significant reductions. At the same time, population aging has resulted in higher prevalence rates of chronic disease burden, such as cardiovascular disease, cancer, and tobacco-related illnesses, due to declines in mortality and fertility rates. Nonetheless, a sizable proportion of the population, particularly in rural areas, continues to suffer from vaccine-preventable diseases, pregnancy and childbirth-related complications, and malnutrition.

India has seen only modest health improvements in comparison to neighbouring

South Asian countries, owing to wide disparities in health gains between prosperous and impoverished states. Slower growth in India can be attributed in part to insufficient investment in health care. Public health spending in India is among the lowest in the world, and much lower than would be expected given the country's per capita GDP. [5] As a result, private health spending fills the void left by low public spending. Private health spending is among the highest in the world as a share of total health spending, at four times that of public spending. Because of the high level of private spending, households bear a large portion of the burden of health-care costs. High out-of-pocket health-care costs are another major source of household impoverishment. Annual household health expenditures in India total more than crores. However, because the private sector is unregulated, curative care is frequently prioritized over more efficient preventative care, resulting in wasteful and ineffective health spending. India launched the National Rural Health Mission in 2005 to provide accessible, affordable, and high-quality health care to its rural populations, particularly the poor and vulnerable. The mission's central goal is to increase public health spending, expand public health services, improve infrastructure and staffing, and reduce the burden of health

spending on the country's poor. The mission's goal is to help bridge the large health disparities between affluent and poorer states, to sustain health gains in high-performing states, and to address the chronic disease burden that will increasingly strain India's health-care system. [6]

If additional public health spending is to yield significant health benefits, it must be appropriately targeted. Only by undermining the perverse incentive in the private sector to offer expensive, wastefully inappropriate treatments can public spending be more effective than private spending. In determining how to best use the additional resources to improve health, the National Rural Health Mission should prioritize interventions that achieve the greatest level of health gain across the population, while also improving the basic staffing and infrastructure of public health services.

Targeted interventions should also address illness conditions that are significant contributors to infant and childhood mortality as well as the burdens of infectious diseases in order to better fulfil the needs of individuals who are underserved by the current system. Providing a broad range of health therapies without consideration for shared costs or inputs may be less successful than universalizing a

group of specific interventions. [7] It is easier to plan new investments in infrastructure and training when a set of fundamental government interventions is defined. It also helps estimate financial requirements and makes it simpler to analyse and evaluate service availability and impact. Moreover, establishing a set package makes clear to citizens and health providers alike exactly which services the government will and will not fund, reducing the potential for the rent-seeking that occurs when poor consumers are not aware of their entitlements.

#### **Methodology:**

Current methods of economic evaluation may not be adequately equipped to compute the economic and health impact of preventive interventions when determining the cost-effectiveness of prevention [8,9,10]. The need to estimate long-term costs and outcomes; the use and validity of decision-analytic modelling approaches; the definition of the preventive intervention and the comparator (i.e., the recipients of the intervention, the setting in which the intervention is delivered, the various activities that make up the intervention, etc.) are some examples of specific methodological limitations.- the use of disease-specific rather than generic outcome measures; - the inclusion of benefits beyond those measured by

traditional clinical outcome measures such as quality-adjusted life years;

- the economic and health impact of the intervention on individuals other than the user of the intervention;

- the inclusion of unrelated health care costs in life years gained through prevention. As a result, economic evaluations may underestimate or over-estimate the cost-effectiveness of preventive interventions.

#### **Evidence of cost-effective prevention of diabetes and non-communicable disease:**

More than 20% of Indians are affected by chronic noncommunicable diseases (NCDs), and incidence and prevalence are predicted to considerably increase as the number of persons aged 60 and older increases [11]. Socioeconomic factors such as alcohol and cigarette use, inactivity, and poor eating are all on the rise, demanding deliberate intervention that goes beyond economic growth and access to medical treatment alone. Because chronic disease risk factors overlap, the advantages of preventive measures aimed at them are probably greater than those of preventing just one NCD, such as diabetes. Population-based interventions, such as advertising restrictions, food sector regulations, mass media campaigns, and cigarette and alcohol levies, have been found to be the most cost-effective

due to their extremely low marginal costs. But these treatments require a concerted public effort.

Although universal diabetes screening is not available in India, lifestyle modification to lose weight, increase activity, and improve diets, as well as metformin to prevent diabetes, have been found to be highly cost-effective [8]. Sathish and colleagues' cost-effectiveness study of the Kerala Diabetes Prevention Program (K-DPP) adds evidence on how to prevent diabetes in India and other low- and middle-income countries (LMIC) [9]. Several aspects of the study deserve special attention. The authors present a cost-effectiveness analysis of 1007 K-DPP participants, discovering that the societal cost per QALY gained was US\$155, and the health system cost per QALY gained was roughly one-third of that (i.e., \$US50). The corresponding estimates of cost per diabetes case avoided were nearly twice as high, based on a non-statistically significant absolute risk reduction of 2.1%. According to their calculations, K-DPP was cost-effective. More specifically, the uncertainty analyses indicate that 80% or more of the bootstrap estimates were cost-effective, and that the ICERs remained below the cost-effectiveness threshold in sensitivity analyses, which moved the costs and effectiveness up or down by 10-

30%. Surprisingly, the results for only a two-year period are not encouraging. Unsurprisingly for just a 2-year period, results are not sensitive to differences in discounting of costs and effects. Of course, no study is without some limitations, and the authors appropriately acknowledge a long list. At the most extreme, sensitivity analyses reduced the point estimate of effectiveness by 30%, rather than the 100% reduction implied by effectiveness being statistically insignificantly different from zero. More broadly, the effectiveness and cost-effectiveness of interventions like the one under consideration are likely to be affected by the study population and duration. For two years, this study followed mostly poor unskilled workers in one rural sub-district of India. Preventive care benefits typically accumulate over time, potentially increasing the intervention's cost effectiveness over a longer time horizon. However, it is unclear to what extent the effects of one-time behaviour change interventions will be sustained rather than fading over time.[10-14]

Furthermore, different populations may have varying levels of intervention take-up, and effectiveness, contingent on take-up, may vary across a variety of factors, such as access to outside sources of the same information provided in the intervention or baseline health

status. Costs may differ between populations due to differences in preferences and opportunity costs. There may also be scale economies. To clarify these dimensions of cost-effectiveness, a larger sample over a longer time horizon is required. Nonetheless, the study demonstrates potential cost-effectiveness in "nudging" participants toward a healthier lifestyle, as evidenced by suggestive reductions in tobacco and alcohol use, as well as waist circumference. The findings emphasize the importance of continuing research on community-based healthy lifestyle promotion. After all, many health conditions could be avoided if all middle-aged people followed K-DPP-targeted risk factors such as physical activity, healthy eating habits, no tobacco, limited alcohol, and adequate sleep. Furthermore, such health-promoting interventions supplement current policy efforts to promote healthy aging.[13-16]

### **Public Health Perspective :**

To evaluate a program from the standpoint of public health, two types of costs must be collected: the actual costs of developing and implementing the program, as well as the value of donated resources or resources not funded by the program. The value of donated resources and non-program resources must be quantified for three reasons:

1. If the program is to be implemented in a new community or expanded to include more participants in the same community, donated resources may no longer be available or sufficient; thus, to estimate the costs of implementing a program elsewhere or expanding a current program, the value of these resources must be included when costs for the current program are quantified.
2. If costs for similar programs in different communities are being collected, donated resources must be included to ensure that the costs between programs are comparable.
3. Because donated resources are likely to have an impact on program effectiveness, their value must be factored into the costs of economic evaluation.

### **Discussion:**

Deeper understanding of the role of human health as a critical component of economic development has stimulated interest in improving the efficiency with which the modest health resources available in low- and middle-income countries (LMICs) are spent. Health promotion is defined as the process of empowering people to increase control over their health and its determinants through health literacy efforts and multi sectors action to increase healthy behaviours. This process includes activities for the community-at-large or

for populations at increased risk of negative health outcomes. Health promotion usually addresses behavioural risk factors such as tobacco use, obesity, diet and physical inactivity, as well as the areas of mental health, injury prevention, drug abuse control, alcohol control, health behaviour related to HIV, and sexual health. Disease prevention, as specific, population-based and individual-based interventions for primary and secondary (early detection) prevention, aims to minimize the burden of diseases and associated risk factors. Disease control is defined as the reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction. CEA is a helpful tool that can be used to inform and influence the decision-making process. However, many factors may affect decision making, and it is important to acknowledge that CEA is just one of them. Cost-effectiveness ratios can be used to set health priorities in two ways. One approach is to use a cut-off level of cost-effectiveness beyond which interventions are no longer used. This cutoff can vary from place to place depending on the availability of health resources, the disease burden, and the local preferences for health spending. The costs and efficacy of

interventions may vary greatly, even within a single geographical region, depending on local health system capacity, cultural context, disease epidemiology, and a host of other factors. Greater efficiency in how countries spend their health care resources can have a tremendous effect on the health of their populations.[17-20]

### **Conclusion:**

Economic evaluation serves as an instrument to maximize population health subject to the constraint of limited resources. However, cost-effectiveness is only one of the criteria in the decision-making process, and is probably not the most important criterion when focusing on preventive interventions. In addition to cost-effectiveness, decision making by policy makers may be guided by equity concerns or the need to achieve certain targets by means of for example public health interventions. This is exemplified by the observation that decision makers have sometimes funded preventive interventions with high cost-effectiveness ratios or refused funding for interventions with low cost-effectiveness ratios. In reality, the health system in India is weak in many areas and prone to rent-seeking, especially in some states. Nationwide, the publicly provided health system suffers from serious deficiencies in



infrastructure, equipment, staffing, and training at all levels of care.

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**Source of Support: None declared**

**Conflict of interest: Nil**

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An Official Publication of ARCA- AYURVEDA RESEARCH & CAREER ACADEMY

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