

## REVIEW ARTICLE

# Health Impact Assessment as a tool in India for evaluating how policies, programs influence the health of the population

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### ARTICLE CYCLE

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### ABSTRACT

**Background:** Health Impact Assessment (HIA) systematically assesses the health impacts of policies, programs on a population, with a focus on the holistic well-being of individuals. This approach employs diverse methods to identify positive and negative health impacts, along with unintended consequences, offering recommendations for effective management. HIA considers economic, social, psychological, environmental, and organizational factors in community health. The process involves key steps like assessing baseline health, identifying impacts, quantifying and valuing them, ranking importance, and proposing management recommendations. HIA can be prospective, retrospective, or concurrent during implementation. **Methodology:** The systematic process included a detailed protocol for scoping review, comprehensive database search, and inclusion criteria for studies published in English from January 2020 to December 2023. **Results:** Its importance resides in enhancing decision-making by providing insights into health ramifications, fostering dedication to implementing recommendations, and tackling both immediate and indirect developmental effects on health. HIA engages in promoting democratic processes, fairness, sustainable development, and ethical use of evidence in conducting comprehensive impact evaluations. Despite global recognition, barriers like limited funding, insufficient evidence, and perceived time constraints exist. Solutions, such as creative funding, evidence consolidation, and long-term cost-effectiveness, show potential for overcoming these barriers. **Conclusion:** HIA serves as a valuable instrument for giving precedence to community health decision-making, nurturing fair and sustainable development.

### KEYWORDS

Health Impact Assessment, Health determinants, Prospective HIA, Retrospective HIA

### INTRODUCTION

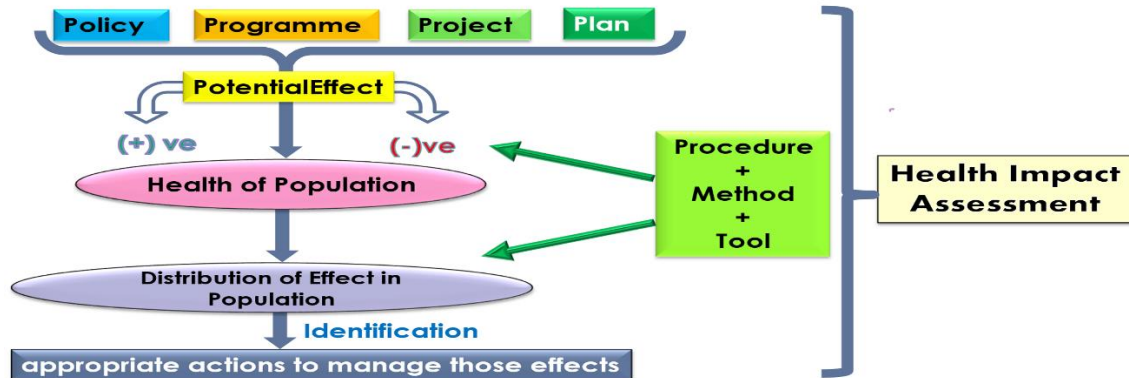
Health Impact Assessment (HIA) employs an all-encompassing methodology, integrating processes, techniques, and instruments to

evaluate how policies, programs, or projects may affect the health of a population and how these effects are distributed. It surpasses the evaluation of the mere absence of disease or

infirmity, encompassing physical, mental, and social well-being. HIA seeks to recognize both favourable and unfavourable health impacts,

proposing suitable measures to handle and amplify the positive effects while alleviating the negative ones (Figure 1).(1)

**Figure 1. Health Impact Assessment with positive and negatively health impact.**



The inception of HIA dates back to 1999 when it was initially introduced through the Gothenburg consensus paper. This document characterized HIA as a method for scrutinizing the possible health consequences and their distribution across a population arising from a policy, program, or project.(2)

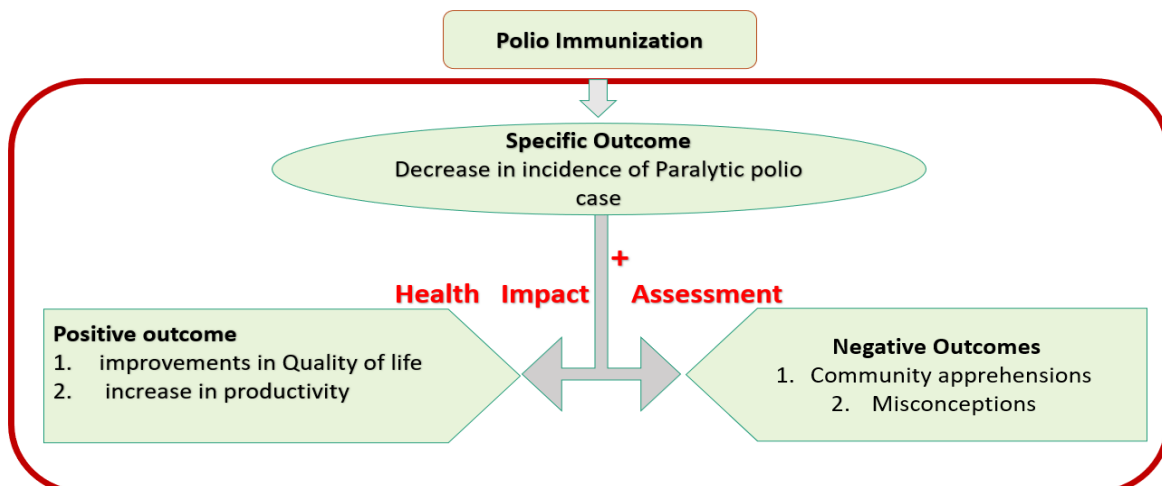
The World Health Organization (WHO) expanded this definition in 2006, emphasizing systematic assessment of intended and unintended health effects and identification of measures to address them. Recognizing that community health is shaped by various influences, including economic, social, psychological, environmental, and organizational factors, underscores the crucial role of HIA in estimating their impact before

implementing policies, programs, or projects.(3)

HIA, introduced in 1999 and expanded by WHO in 2006, assesses health effects and their distribution from policies, programs, or projects. Acknowledging the diverse influences on community health, including economic, social, psychological, environmental, and organizational factors, highlights HIA's crucial role in estimating their impact before implementation.(4)

The significance of HIA stems from its capacity to contribute value to decision-making procedures. It conducts a thorough evaluation of both potential beneficial and adverse health effects associated with a proposition or intervention which can be understood by example on Polio (figure 2).

**Figure 2 Understanding Health impact Assessment for Polio Immunization**



**Aims and Objectives:**

1. To assess the role of HIA in amplifying the positive outcomes while minimizing the negative ones to the greatest extent feasible.
2. To assess the consolidation of existing evidence, the long-term cost-effectiveness of HIA.

Despite its advantages, conducting HIA presents several hurdles. These include constraints related to funding, insufficient evidence showcasing health impacts, perceptions among policymakers regarding the time and cost involved, and shortcomings in reporting. However, and the establishment of independent agencies to facilitate proper implementation.(5)

**MATERIAL & METHODS**

**Study type & study design:** This scoping review aimed to comprehensively examine global literature on health impact assessment, with a focus on the Indian perspective. The systematic process involved developing a detailed protocol with predefined criteria for inclusion/exclusion, search strategies, and review structure.

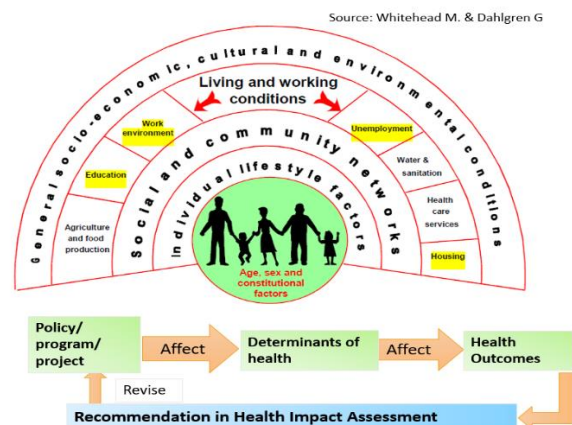
**Strategy for data collection:** A thorough exploration spanning electronic databases and local resources employed medical subject headings (MeSH) and terms associated with impact assessment for health policy, Impact of programs and HIA in the Indian context i.e. ("health impact assessment"[MeSH Terms] OR ("health"[All Fields] AND "impact"[All Fields] AND "assessment"[All Fields]) OR "health impact assessment"[All Fields]) AND "India"[Title/Abstract]). The inclusion criteria involved studies that concentrated on health impact assessment, providing specific details about India. This included primary research, systematic reviews, policy documents, and reports published in English from January 2020 to December 2023. Two reviewers worked independently to assess titles and abstracts, and the eligibility of full-text articles was subsequently appraised. Data extraction utilized a standardized form to capture details on regulatory frameworks, challenges, successes, and insights related to the Indian context in Health Impact Assessment.

**RESULTS & DISCUSSION**

**Evolution :** Developed by WHO in the 1980s to address vector-borne diseases in water projects, HIA gained global recognition. The first HIA conference occurred in the UK in 1998, coinciding with WHO's adoption of the Merseyside guidance. In 2003, the WHO European Healthy Cities Network initiated Phase IV, promoting HIA in 50 European cities. In India, HIAs for projects like the Sardar Sarovar Water Resources Development Project and Konkan Railway paved the way for HIA implementation nationally.(6)

**Significance of Conducting Health Impact Assessment:** HIA enhances decision-making by systematically assessing positive and negative health impacts, encompassing broader social, environmental, and economic factors. It addresses underlying health determinants to enhance positive effects and mitigate negative impacts. HIA prioritizes equity by examining health impact distribution across the population, considering factors like gender, age, ethnicity, and socioeconomic status. Additionally, It acknowledges the interconnectedness of health with sustainable development, evaluating both immediate and enduring effects, and advocating for comprehensive decision-making that encompasses social, economic, and environmental factors (Figure 3).(3)

**Figure 3. Health Determinants and Health Impact Assessment**



**Health Determinants and HIA**

Community health is influenced by various determinants, including economic, social, psychological, environmental, and

organizational factors. HIA recognizes the importance of these determinants and estimates their influence on policies, programs, and projects. Prior to executing any proposal, it's vital to evaluate the prospective health ramifications stemming from these factors. HIA scrutinizes the correlation between the suggested intervention and the influencers of health. It takes into account elements like established social and economic contexts, individual behaviours and habits, accessibility to services, genetic predispositions, gender, aging, socioeconomic status, employment opportunities, social marginalization, community dynamics, infrastructure, air and water quality, risk of injury, sun exposure, disease vectors, Nutrition, exercise, tobacco use, alcohol consumption, sexual conduct, substance use, educational pursuits, healthcare practices, social services, transportation, and recreational activities.(2)

By thoroughly evaluating the impact of these determinants, HIA offers a comprehensive assessment of potential health outcomes, empowering decision-makers to acknowledge and tackle the root causes of health disparities.(7)

**Categories of Health Impact Assessment:** Diverse Forms of HIA types cater to specific contexts and objectives:

- a) Rapid HIA responds swiftly to urgent proposals, focusing on immediate health impacts for timely recommendations.
- b) Desktop HIA analyses existing data when the primary collection isn't feasible, ideal for preliminary assessments.
- c) Comprehensive HIA gathers primary data through surveys for detailed health impact understanding.
- d) Strategic HIA assesses health impacts at the policy or planning stage, shaping health-promoting policies early on.
- e) Project-level HIA scrutinizes specific projects, providing recommendations for minimizing negative and enhancing positive health impacts.(8)

**The Process of Health Impact Assessment:** HIA typically encompasses a sequence of steps to navigate the assessment. Although the precise steps may differ based on the situation, the

following fundamental Stages are commonly integrated comprising three Stages: Stage 1 (Policy and Programme development Stage) which includes screening and scoping, Stage 2 (Appraisal & Reporting Dissemination Stages) which includes Community profiling and baseline information, Stakeholder and community involvement, Gathering of evidence, Analysis of health Impact, Development of mitigation and enhancement measures. Stage 3 (Monitoring & Evaluation) include Reporting, Health management plan, and follow-up. (Figure 4)(9)

**Stage 1 (Policy and Programme Development Stage):**

**Step 1 (Screening):** The screening stage includes determining whether an HIA is needed for a particular proposal. It aids in identifying proposals with strong health impacts and demands a comprehensive assessment.

**Step 2 (Scoping):** This stage involves the identification of the focus and boundaries of the HIA. This includes identifying critical determinants of health and defining the objectives and scope of the assessment and the stakeholders involved.

**Stage 2 (Appraisal & Reporting Dissemination Stages):** **Step 3:** Understanding community demographics, socio-economic indicators, and their present health status forms the centerpiece of community profiling and baseline information in Step 3.

**Step 4:** Engaging in Step 4, this is for stakeholder and community involvement, where diverse perspectives will be considered to foster inclusivity and transparency.

**Step 5:** The effort of gathering evidence for Step 5, Analysis of Health Impact, involves a multitude of sources that provide evidence to the assessment for making a reliable estimation of potential impacts of the health effects on the population.

**Step 6:** The evidence that was collected is critically evaluated in Step 6, Analysis of Health Impact, to estimate the magnitude and distribution of potential health effects across different demographic groups, considering both direct and indirect pathways.

**In Step 7** of the Health Impact Assessment (HIA), Monitoring & Evaluation comes on

board to establish how effective the implemented measures really are and how they affect health outcomes.

**Clear and comprehensive documentation of findings** in **Stage 3**, Reporting, is important because it is informative to stakeholders and decision-makers. This stage is composed of:

**Monitoring:** This ensures that what is actually happening is being done concerning the efficiency of mitigation measures and health impacts that arise as a result of the policy, project, or program. The learning process is then as a result of continuing learning and ways on which HIA processes can be improved.

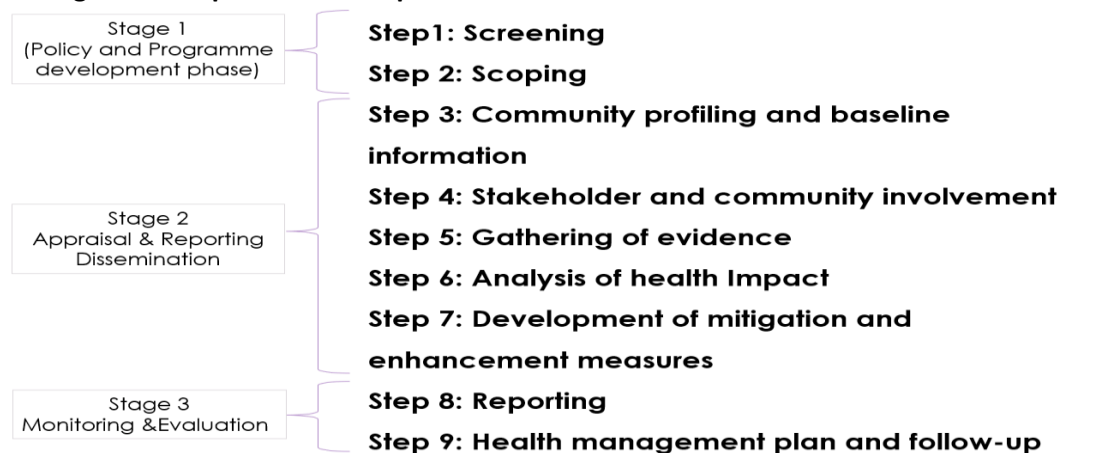
**Evaluation:** This comprises synthesizing and interpreting findings from the assessment to evaluate the magnitude and likelihood of health impacts and, in turn, assess the distribution of impacts amongst different demographic groups.

**Reporting:** This stage involves giving out a report summarizing the HIA process, findings, and recommendations. The report has to be in a way that both technical and non-technical audiences can easily understand the potential health impacts and actions to be taken.

In **Step 9 of Stage 3** several critical activities are identified to be undertaken to ensure the process of the Health Impact Assessment (HIA) is effective and also maintains its integrity. Firstly, a proper Assessment Stage that involves the gathering and analysis of relevant data through surveys, interviews, and a literature review is meticulous. This comprehensive assessment aims at identifying potential health implications, identifying

vulnerable populations, and suggest measures for mitigation. Then, Integration requires the integration of findings and recommendations from the HIA into the decision-making process. This stage will hence involve collaborating with decision-makers and stakeholders towards incorporating health concerns into the final decisions. Communication and engagement are also critical at this stage through continuous interaction with communities, policymakers, professionals, and other stakeholders. This interaction facilitates the flow of information, input elicitation, and creation of support for the assessment findings and recommendations. Additionally, there should be capacity-building initiatives that will hone the skills and knowledge of people and organizations involved in HIA implementation. This process will include training, resources, and support, and it is ongoing, to improve the quality and effectiveness of future HIA efforts. Lastly, Review and Quality Assurance is built into the process to maintain the rigor and credibility of HIA. Independent reviews are done to determine accuracy, transparency, and adherence to established guidelines and standards; these include peer review or external validation processes. The concerted efforts in **Step 9** will thus contribute towards ensuring the robustness and reliability of the HIA outcomes, resulting in informed decision-making and a positive impact on health outcomes for the communities. Decision-making and improved health outcomes for communities.(10)

**Figure 4 Stages and Steps of Health Impact Assessment**



HIA presents a structured method for evaluating the potential health effects of

policies, plans, and projects. It advocates for decision-making rooted in evidence,

encourages partnerships between health and non-health sectors, and enables communities to engage in shaping decisions that affect their health and overall welfare.

#### **Evaluating Health Impacts in Infrastructure Development Projects: Two HIA studies**

The study of some two important Health Impact Assessment (HIA) cases is an illustration of how to evaluate big infrastructure projects. In Gujarat, India there was the Sardar Sarovar Water Resources Development Project which was aimed at constructing a large dam on River Narmada for irrigation water, drinking water and hydroelectric power.

For instance, its HIA studied very carefully such likely health impacts as dam building, reservoir creation, community displacements and changes in water quality and supply. The Health Impact Assessment also carried out by Delhi Metro Rail Project (DMRC) – a well-known urban transport initiative in Delhi – analysed the health outcomes linked with the establishment and operation of metro rail system as well as highlighted the significance that must be accorded to public infrastructure projects when evaluating their potential health repercussions<sup>(11)</sup>

**Sardar Sarovar Water Resources Development Project:** An illustration of a project undergoing Health Impact Assessment is the Sardar Sarovar Water Resources Development Project in Gujarat, India. This comprehensive initiative included the construction of a sizable dam on the Narmada River, to supply irrigation water, drinking water, and hydroelectric power to the region. The HIA for the Sardar Sarovar Project assessed the potential health impacts associated with the dam's construction, reservoir formation, displacement of communities, and changes in water availability and quality. Here are some of the key health impacts that were identified:

1. **Displacement and resettlement:** The construction of the dam resulted in the displacement of numerous communities residing in the project area. The HIA examined the potential physical, mental, and social health impacts of relocation on the affected populations, including access to healthcare,

disruption of social support networks, and changes in livelihood patterns.

2. **Waterborne diseases:** The creation of the reservoir led to changes in water availability, quality, and vector habitats. The HIA evaluated the likelihood of waterborne illnesses like malaria, dengue, and diarrheal diseases resulting from heightened exposure to stagnant water and alterations in water sources used for drinking and sanitation purposes.

3. **Nutrition and food security:** The project aimed to improve irrigation for agriculture. The HIA examined the potential impacts on food security, agricultural practices, and nutritional status in the region, considering factors such as changes in land use, availability of irrigation water, and access to diverse and nutritious food.

4. **Occupational health and safety:** The construction of the dam involved labour-intensive activities, which posed risks to the worker's health and safety. The HIA assessed the potential hazards and provided recommendations to ensure safe working conditions, access to healthcare services, and adequate protection for the workers.

Based on the findings of the HIA, several mitigation and enhancement measures were recommended, such as:

Developing comprehensive rehabilitation and resettlement plans for the affected communities, including access to healthcare, education, and livelihood opportunities.

Implementing vector control measures to mitigate the risk of waterborne diseases, including regular monitoring of vector populations and promoting community awareness and participation.

Promoting sustainable agricultural practices and ensuring access to irrigation water for smallholder farmers, with a focus on enhancing food security and nutrition.

Implementing occupational health and safety measures for workers involved in construction activities, including training, personal protective equipment, and regular health check-ups.

The HIA for the Sardar Sarovar Project highlighted the potential health impacts of the project and provided recommendations to

minimize adverse effects and enhance positive outcomes. It helped policymakers and stakeholders make informed decisions,

ensuring that health considerations were integrated into the planning and implementation processes.(12)

**Table 1(a) Stages of HIA in Sardar Sarovar Water Resources Development Project**

Stages Of HIA	HIA tasks
<b>Stage 1. Policy and Programme Development Stage (screening and scoping)</b>	Identifying health effects on the population group, assessing well-being in terms of provisions of Electricity, Irrigation, and Drinking Water. Population Involved: engineers, workers, labourers Creation of HIA Steering Group: NIMR*, Stakeholder Terms of reference for the HIA : Agency involved in carrying out HIA: NIMR Timeline for HIA: till 1994-1998 Area: Area within 3 km of the Dam
<b>Stage 2 (appraisal and reporting dissemination)</b>	Analyzing of health effects: Incidence and prevalence rates malaria Results: High Incidence in Population nearby Disseminating the report Assessment: environmental receptivity community vulnerability Health service preparedness
<b>Stage 3 Monitoring, Evaluation and Reporting health management plan</b>	Monitoring 1. Abundance of mosquito vector 2. insecticide susceptibility Evaluation 1. Low parasite rate as shown by mass blood surveys, 2. Low incidence of malaria

\*NIMR: National Institute of Medical Research

**Another example is The Delhi Metro Rail Project** is a major urban infrastructure project aimed at improving public transportation in the city of Delhi. The HIA conducted for this project assessed the possible health effects linked to the establishment and operation of the metro rail system were evaluated. The following are some significant health impacts that were taken into account:

**Air pollution:** The construction activities and increased vehicular movement during the project can contribute to air pollution, which has significant health implications. The HIA examined the potential increase in particulate matter, nitrogen dioxide, and other pollutants and their impacts on respiratory health, cardiovascular health, and overall well-being of the communities living near construction sites and metro stations.

**Noise pollution:** The operation of metro trains and construction activities can generate high levels of noise, leading to annoyance, sleep disturbance, and stress-related health effects.

The HIA assessed the potential noise levels and their impact on mental health, sleep quality, and overall quality of life of residents living near metro corridors and stations.

**Safety risks:** The HIA considered the safety risks associated with the operation of the metro rail system, including accidents, falls, and other potential hazards. It evaluated the potential injuries, disabilities, and long-term health effects of accidents on passengers, employees, and nearby communities.

**Accessibility and physical activity:** The HIA investigated how the metro rail system influenced the encouragement of physical activity and the enhancement of accessibility to healthcare facilities, educational institutions, job prospects, and other vital services. It evaluated the possible health advantages associated with heightened physical activity and decreased dependence on personal vehicles for commuting.

Based on the HIA findings, several suggested measures and enhancements were proposed, covering a range of aspects:

Implementing air pollution control measures during construction, such as dust suppression techniques, use of clean construction equipment, and regular monitoring of air quality.

Implementing noise reduction strategies, such as noise barriers, appropriate design and maintenance of tracks and trains, and adherence to noise emission standards.

Ensuring robust safety measures, including training for metro staff, proper maintenance of infrastructure, implementation of emergency response protocols, and public awareness campaigns on safety precautions.

Designing metro stations and surrounding areas to promote walking, cycling, and physical activity, including pedestrian-friendly infrastructure, access to green spaces, and provision of bicycle parking facilities.

The Health Impact Assessment (HIA) conducted for the Delhi Metro Rail Project sought to guarantee that the health effects of the project were taken into account and dealt with throughout the planning and implementation Stages. By incorporating health considerations into decision-making processes, it aided in recognizing potential risks and opportunities to enhance the health and well-being of the population impacted by the project.

**Some recent uses of HIA :** Even though Health Impact Assessment (HIA) is increasingly recognized as a valuable way to evaluate the health implications of various projects and policies, there is a paucity of literature written about its use in India. The employment of HIA in Indian settings has not been adequately explored and documented, necessitating therefore reliance on international literature and case studies from other countries for an understanding of how HIA methods might be applicable and effective assessments made within India. By digging into external researches, this article sought to explore the possibility and the advantage of using HIA.

Madlene movie *et al* (2022) Conducted a Health Impact Assessment on Daily Physical Activity in Austrian Schools, marking a

pioneering effort for children and adolescents. The focus was on evaluating the impact of introducing a daily physical activity unit in schools for children up to eighth grade. Employing a comprehensive methodology that included literature reviews, online surveys, focus group discussions, and workshops, the assessment identified positive effects on individual health, social networks, living conditions, and the overall system. Factors considered for successful implementation included ensuring equitable opportunities, promoting voluntary participation, providing teacher/coach training, accommodating school-specific differences, assessing infrastructure availability, and selecting pilot regions. The long-term vision emphasizes increased integration of physical activity, particularly in the elementary/nursery school sector. Recommendations derived from group discussions and workshops underscore the importance of high-quality execution to ensure enduring health benefits for children and adolescents.(13)

Melissa Chinchilla *et al* (2017) The purpose of Health Impact Assessment (HIA) is to instruct students in public health and urban planning on assessing potential health outcomes associated with proposed policies, plans, and projects. It is recommended that public health and urban planning, as fields of study, provide complementary frameworks to train professionals in addressing factors that influence community well-being. Urban planning emphasizes practical skills for instigating community change, while public health places importance on ethical considerations and professional purpose. Integrating frameworks from both disciplines can enhance the learning experience in HIA, helping students navigate inquiries related to community impact, engagement, social justice, and ethical considerations. Furthermore, we suggest that community engagement processes in HIA can be further improved by including empathetic practices that encourage personal introspection.(14)

Lindsay C. McCallum *et al* (2016) conducted HIA of an oil drilling project in California aimed to evaluate the potential community health effects of a proposed oil drilling and



production project. The assessment examined 17 determinants of health categorized into 6 major areas, including air and water quality, noise, traffic, and community livability. This comprehensive HIA addressed methodological gaps by introducing an evaluation matrix and decision-making framework, enabling clear determinations for each health factor. Positive aspects of the project, such as increased education funding and improved green spaces, were identified, alongside potential negatives like odor and property value impacts. While negative health outcomes were primarily nuisances with limited irreversible effects, the majority of assessed determinants indicated minimal impact on community health. Using this methodology, mitigation measures, and recommendations, the authors concluded that the project's influence on community health would be negligible. This approach enhances the applicability of HIA as a reproducible and informative tool, benefitting practitioners, stakeholders, and decision-makers.(15)

#### **Importance of HIA**

Health Impact Assessment (HIA) is pivotal in decision-making and policy development by systematically evaluating potential health impacts of proposed actions. Its importance lies in:

1. Adding value to decision-making: HIA offers evidence-based insights for informed choices by assessing positive and negative health impacts.
2. Enhancing positive effects and mitigating negative effects: HIA shapes proposals early on to enhance positive health impacts and mitigate potential harm.
3. Addressing social, environmental, and economic impacts: Beyond direct health impacts, HIA addresses social, environmental, and economic factors influencing health outcomes.
4. Promoting equity: HIA ensures fair distribution of health impacts, preventing disproportionate effects on vulnerable groups and promoting social justice.
5. Engaging stakeholders and communities: HIA engages stakeholders and communities, fostering transparency, trust, and inclusivity throughout the assessment process.(16)

**Barriers and Solutions** : In the context of evaluating how policies and programs influence the health of the population in India, it's crucial to acknowledge potential barriers and solutions associated with implementing Health Impact Assessment (HIA). Despite the benefits of HIA, several barriers can hinder its effective implementation. Addressing these barriers is essential to realize the full potential of HIA.(17) Here are some common barriers and potential solutions:

1. Funding: Limited funding may hinder HIA implementation; exploring creative funding sources and demonstrating cost-effectiveness through case studies is crucial.(15)
2. Limited evidence: Insufficient evidence for health impacts of proposed policies can be addressed by consolidating existing evidence, fostering collaboration with researchers, and building a robust evidence base for HIA.(18)
3. Policymakers may view HIA as time-consuming and costly; emphasizing its long-term benefits, including improved health outcomes and reduced healthcare costs, is essential.(19)
4. Inadequate reporting: Inadequate reporting of HIA findings undermines its effectiveness; establishing clear guidelines for comprehensive, transparent, and accessible reporting ensures its impact.(16)

In conclusion, HIA is a valuable tool for assessing and promoting the health impacts of policies, plans, and projects. By recognizing its importance and addressing barriers to its implementation, policymakers, communities, and organizations can harness the power of HIA to make informed decisions that prioritize health, well-being, and equity.(20)

#### **CONCLUSION**

The Health Impact Assessment (HIA) emerges as a crucial tool for understanding how policies, programs, and projects can affect people's health, as seen in the detailed studies of the Sardar Sarovar Water Resources Development Project in Gujarat, India, and the Delhi Metro Rail Project. By taking a methodical approach, HIA enables decision-

makers to prioritize the well-being of communities when making choices. The examination of the Sardar Sarovar Project through HIA highlighted the importance of considering various health factors in infrastructure planning, such as displacement, waterborne diseases, and worker safety. By providing practical recommendations like rehabilitation and vector control measures, HIA offers ways to lessen negative health impacts and improve outcomes. Similarly, the HIA for the Delhi Metro Rail Project stressed the need to assess health effects linked to urban transportation, like pollution and safety risks, helping decision-makers understand how to mitigate these issues and promote public health.

the organized phases of the HIA procedure guarantee a thorough assessment of health effects at each stage of a project's development. Ultimately, incorporating HIA into the planning and execution stages promotes equity, improves health results, and fosters sustainable development for communities globally.

#### **AUTHORS CONTRIBUTION**

All authors have contributed equally.

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Nil

#### **CONFLICT OF INTEREST**

There is no Conflict of Interest.

#### **DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS**

During the preparation of this work, the authors utilized AI-powered tools such as Chat GPT, Research Rabbit in order to enhance the quality and efficiency of content generation. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

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