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Review Article

Health Impact Assessment: Recent Development and Challenges

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ABSTRACT

It is known to all that health is blending up with different aspects, therefore it has its own effects of health and non-health policies and projects. Giving priority to non-health area is much relevant for positive public health attainment. HIA is one of the effective tools in non-health area for assessing the impact on public health. It acts as a powerful weapon in terms of policy making and implementing it ethically. Developmental projects like national highway, railway project, township, nuclear power plant, thermal plant, chemical industries, mining industry, petroleum refineries, commercial projects, airports, water power projects etc. have number of direct and indirect health impact (positive as well as negative) on population. These all project are for human development, but if these projects have negative impact on public health, then the real efforts and purpose of development vanish.

This review paper is an introduction to HIA, why we need it and how it works for health and development. Few definitions are used to explain HIA and its working style. The Values and principles which are followed in HIA are also a part of this review. These values and principles differentiate HIA and EIA. India is an emerging economy where so many developmental projects taking place. This paper therefore includes current situation of HIA in India. The review paper uses two case studies one of HIA as used in Konkan Railway Project and another on Delhi Development Master Plan to give more clarity on how HIA is done. These core studies show the advantage of HIA which helps for an effective project or development. Meanwhile, it also shows the impact when HIA is not adopted which leads to negative impact on project undertaken towards development.

Key Words: Health Impact Assessment (HIA).

INTRODUCTION

Development & Health: Why HIA is needed

Health of the population and individual is cared and shattered by a multifaceted set of factors that interact over the complete life span. Subsequently if the elements of health are multiple and cooperative action to move on health depend on involvement from many agencies other than the health system, including housing, education, transport, industry, developmental project and many other. These factors may affect the public health directly or indirectly.

Health is directly related to the environment which is directly affecting the various developmental projects (Caussy, Kumar and Sein 2003). It is widely proved that human health is determined by large numbers of factors (Anushrita, et. al. 2014). Hence this is the great scope for improving

the public health which lies outside the control of the Health Services (HS) (Lock 2000).

Development projects have remarkable impact on human health which may create hazardous condition for health and can cause high prevalence of dangerous condition for nation (Caussy, Kumar, and Sein 2003). HIA helps in decision making on health choice alternatives to prevent diseases and in promotion of health (Anushrita, et. al. 2014). During this present time of globalization world is shrinking where all big and small, developed, developing and underdeveloped countries are running or trying to move towards the path of development. There are several big and small developmental projects carried out with help of global and domestic investment. These developmental projects have direct or indirect impact on human health.

Transport, agriculture industry, manufacturing industry, chemical industry, water power projects, nuclear power plant, thermal energy, mining industry and housing have major impact on human health. In developing country like India it can be more adverse if not recognized at early stage. India is an agriculture dependent country, almost 70% population depend on agriculture for day to day life. Use of fertilizers and pesticides is common to increase the crop yield. One hand it is boosting agriculture production and another hand excessive chemical consumption to consumer may lead to serious health issues. In order to protect farmers and consumers from their health hazards HIA is very essential.

Many developmental projects strengthened transportation at all levels. This lead to high development of transport making easy to travel from one place to another place but promoting accidents causing injuries, deaths and putting extra Burden on health services. This also resulted as a main cause for air pollution, noise pollution and gave way towards environmental degradation.

Let's see the example of Bhopal gas tragedy, 3 April 1984. This incident took place in Union Carbide Indian Ltd, Bhopal due to the chemical reaction by leakage of methyl isocyanate. It was one of the biggest chemical disasters of the world. The total unavailability of prior knowledge about MIC Toxicity and detoxification/therapeutic intervention was a great cause for this tragedy along with confusion (Sriramachari, 2010). Here the statement of Dr. Sriramachari is clearly mentioned that India establishes a chemical industry without having awareness of consequent effects of used chemicals. This shows clearly that how India makes policies by neglecting human health while establishing industrial projects.

HIA is based on a broad model of health, which includes economic, political, social, environmental and psychological factors on human health. HIA is concerned about the health of large number of people (population, community, society), and generally works to assess the future health care consequences (positive or negative) of policies, program and development projects (Joffe and Mindell 2005).

Health Impact Assessment aims to influence the decision making process in an open structured way to access developmental projects (Lock, 2000). On base of literature, it's clear that HIA is important need for health system and non-health system in favor of implementing new project and polices. World Health Organization (WHO) helps to make tools for HIA and implement to improve health and wellbeing across sectors. In order to enhance or promote sustainable development, it's necessary to develop and implement such tools as HIA. It can guide policy maker and decision maker to promote the benefits of development projects and reduce negative impact on health.

During the world summit, the UN conference on environment and development, and preparation agenda 21, every WHO region made its own framework for implementing HIA (Caussy, Kumar and Sein, 2003).

WHO define "HIA is a combination of procedures, methods and tools by which a policy, program and project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population (WHO, 2013)."

The current working definition of International Association of Impact Assessment is "HIA is a systematic process it uses an array of data sources and analytic tools or methods, considers input from stakeholders to establish the potential effects of a proposed policy, plan, program, or project on the health of population and its distribution. HIA provides recommendations on monitoring and managing those effects".

Value and Principal of HIA

Like every discipline HIA also follows certain principles and values to play its role effectively. This enables it to be a unique and essential discipline for quality enhancement of policies.

Democracy is one of the basic principles in HIA. This means ensuring the participation of the entire stakeholder and giving importance to their social and cultural values. People have right to participate in HIA process and ensure transparency in the decision making that affects their life.

Equity is another principle that needs to be followed in HIA process. Health impact is combined with reference to the whole population, by treating all as equal and the more importance given to vulnerable sections like elderly, children, women and disabled.

Sustainable development is one the essential process. As it needs to emphasis on both long-term and short-term impact of policy or project. It should not only consider the current health impact of policy; it needs to be examining impacts in future too.

Ethical use of evidence while preparing report, all quantitative and qualitative evidence must be used carefully, to make a comprehensive assessment.

Types of HIA

HIA is divided into three types on the basis of time, resource and available personal to conduct HIA.

Concurrent HIA: This is the type of HIA which works parallel to the policy implementation. The Konkan railway project HIA was of the concurrent type.

Prospective HIA: The HIA conducted with proposed project to assess the expected health impact as the result of implementation.

Retrospective HIA: The HIA conducted to assess the impact of the project which has already been implemented. The HIA conducted for vector-borne disease in Sardar Sarover water resource development project (Gujrat), is one example of retrospective HIA.

Approaches to HIA

There are several approaches advised for HIA, by different experts as per their experience, observation and need of public health. But all the approaches cover almost same aspects to conduct HIA for policies and projects. Following approaches will help to understand HIA.

The process of HIA is fully defined as an eight step approach (1) Screening; (2) Scoping; (3) Community profiling and baseline information; (4) Stakeholder and community involvement; (5) Gathering of evidence; (6) Analysis of health impact; (7) Developing mitigation and enhancement measures and; (8) Reporting (Dua B. and Anita S. A. 2014).

The community tool box, a public service of University of Kansas, given five steps approach for conducting HIA Screening, scoping, assessment, reporting and evaluation.

WHO has established the guideline and tools to carry out HIA under the five steps approach. With that all WHO region developed own approach and procedure to practice HIA.

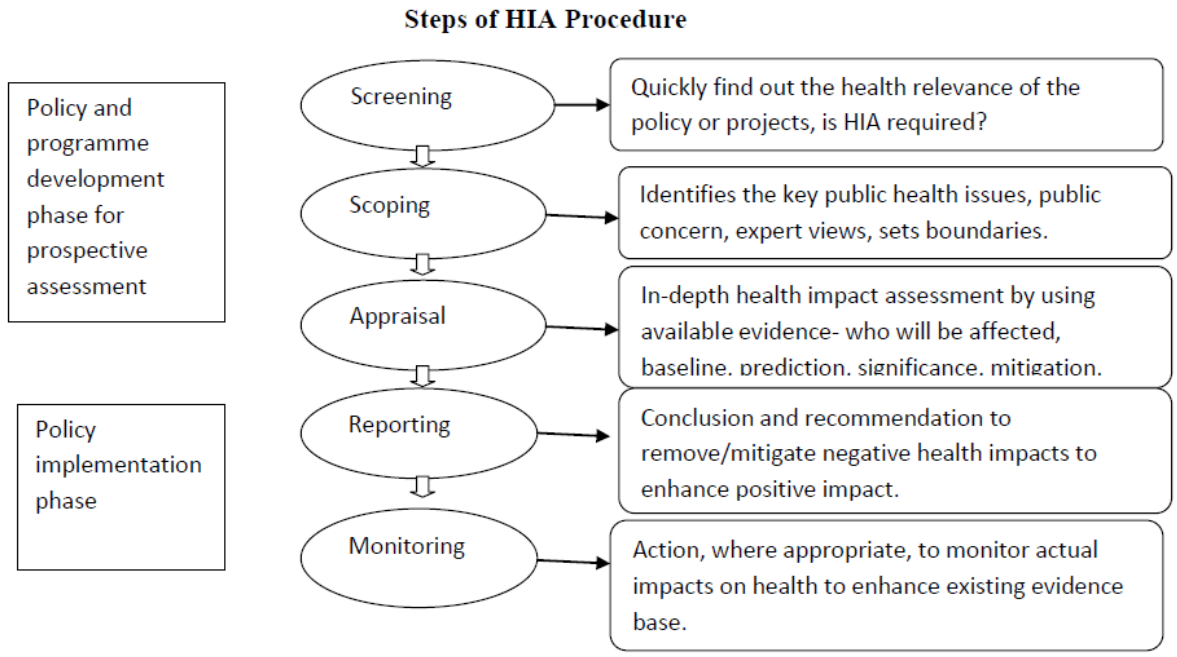

Diagram No. 1, adopted from WHO

Though the steps are more and less in different approaches, but the area covers by all the approaches is same. Therefore by accepting any of these approaches of conducting HIA will be useful.

Learning from Environment Impact Assessment (EIA)

The whole framework of HIA evolved with the EIA (Ahuja, 2007). The process followed by HIA is influenced by methods and principles of EIA. EIA focuses more on environmental impacts of development on air, water, soil and flora. EIA is the study of development policies and projects to assess the effects on environment. EIA assesses both positive and negative impacts of projects, and ensures that these impacts should be considered in project design. A perfect EIA will be very helpful in examining project. EIA focuses towards sustainability of the development by optimum utilization of resources and saving time and cost of project.

EIA (Environment Impact Assessment) is already mandatory to all policy and projects, but its main concentration is on environmental impacts which do not cover the entire health impact. As health is not only influenced by environment there are other factor too which is affecting health. Other factors like social, political, economic, physical and psychological impacts. Therefore HIA is process which is good for policy formation and implementation. HIA process derived from EIA, but considers more of public health aspects on all levels.

Several studies show that, EIA has inadequate focus on the potential health impact of the proposed project (Pradyuman 2015). There are several studies showing that most of environmental assessments in India are not covering health impact. They also overlook cumulative and intergenerational impacts and broader determinants of health (Ahuja 2007).

A paper by Pradyuman 2015, based on two EIA reports is an example of EIA limitation. The EIA Report of Bina Extension Opencast Project of Northern Coalfield Ltd and another Report of Fourth Stage Expansion of the Vindhyachal Super Thermal Power Project of National Thermal Power Corporation (NTPC) 2008 were used for the paper. Both projects are situated in a critically polluted area of Singrauli Madhya Pradesh. The study shows the lack of understanding of EIA in the health assessment area. There are no dedicated paragraphs or annexure which highlight the public health or other health impacts in EIA reports (Pradyuman 2015).

We also noted that not all health impacts are due to environmental impacts, development policies like customs, duties and tariffs also could affect. Economic and trade parameters leading to changes of availability in health related impacts. Factors like migration, displacement and law of employment also have adverse health impact.

In conclusion though there is considerable overlap between EIA and HIA. There are other considerable areas where they do not overlap. Further we note though EIA now excepted in policy, HIA is proposed in draft in health policy but not yet passed.

HIA as a Tool of Policy Formulation

HIA is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within population. HIA provides recommendations on monitoring and managing those effects and promotes positive health impact.

In most instances though ministry of health could be accountable for health outcomes, policy formulation would happened in other ministries. These ministries includes ministry of industry, food & agriculture, urban development, mining, forest, environment etc.

The challenge is to get intersected coordination so that other ministries necessarily rather development projects for health assessment projects. This requires some inter-ministerial coordination committee with the secretariats which can unable discussion. HIA will also be utilized in creating alternative between policy options for example whether a major city should invest on public transport, or what should be the mix of public systems (underground metro, taxies, volvo buses etc.) and have impact on pollution of city.

HIA in India

HIA was introduced by WHO in 1980, specifically for vector-borne diseases due to water projects without using chemicals. First conference on HIA was held in UK in 1998, and in the same year WHO adopted Merseyside guidance on HIA. During that time many developing and developed countries adopted HIA, and started using it for new policy and projects. In year 2003, WHO European Health Cities Network, launched fourth phase of the network, under which 50 European cities were committed to introduce and develop HIA. WHO promoted HIA on the policy and project level all over the European countries, with the help of World Bank.

India rarely used HIA on policy and project level. There are only few projects in which HIA has been utilized. HIA was used concurrently for vector-borne disease at Sardar Sarovar Water Resource Development Project (Gujarat), Bargi Dam Project (Madhya Pradesh) and Indira Sagar Dam (Madhya Pradesh), Konkan Railway Project has been carried out HIA.

A cross sectional survey was conducted in 9 south Asian countries India, Nepal, Bangladesh, Bhutan, Sri Lanka, Myanmar, Maldives, Thailand and Indonesia. Quantitative and qualitative data was collected for the four parameters: Policy and procedure for HIA, Infrastructure for HIA, Capacity for HIA and Potential for intersectional collaboration to implement HIA on broader level. The first criteria policy and procedure for HIA, was accessed on the base on available policy that addresses the all environmental media, the available guideline for HIA in the field of agriculture, Infrastructure, energy and industry sectors, and availability of policies to licensing procedure in the preparation of HIA reports. The result based on these criteria shows that India stands between 26-50% preparedness for the policy and procedures for HIA. Countries like Indonesia, Sri Lanka and Thailand are doing better than India, in the same area. India is doing better in second parameter Infrastructure for HIA, and coming under the criteria of 51-75%, the only country Indonesia stands equal to India. The

parameter capacity building for HIA, India secures the criteria between 51-75%, and one from leading countries Indonesia, Myanmar, Sri Lanka and Thailand. The fourth parameter potential for intersectional collaboration for HIA, was assessed on the based on three criteria, availability of central authority and special task force for organize HIA, need for participation of government and donor agencies and public participation to ensure the stakeholder involvement in HIA. On the base of these criteria India secures position between 76-100%. Data are shown that India is positive towards HIA preparedness but implementation not yet observed.

Table- 1

Summary scores for health Impact Assessment (HIA) for each country based on four parameters.

Countries	Parameters			
	Policy and procedures for HIA	Infrastructure for HIA	Capacity for HIA	Potential for intersectional collaboration
Bangladesh				
Bhutan				
India				
Indonesia				
Maldives				
Myanmar				
Nepal				
Sri Lanka				
Thailand				

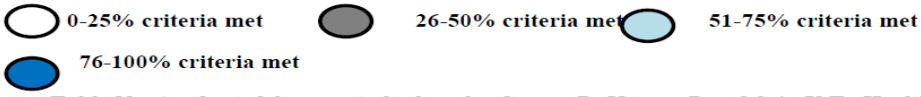

Table No. 1, adopted from a study done by Caussy D, Kumar P and Sein U.T., Health Impact Assessment Need in South East Asian Countries.

But by seeing this results looks that HIA is part of our policy making process, but it is not that true how it looks. Joan Robinson said that "whatever you can rightly say about India, the opposite also true" (Ahuja, 2007). As we already discussed about review paper by Pradyumna (2015).

Projects are in Delhi NCR like in Gurgaon, Noida, Faridabad and Ghaziabad, got EC certificate without any importance to HIA. Commercial and residential project DLF phase five in Gurgaon, is given EC certificate, but the health impact only consider on environment bases. There are such more big examples like Golden Quadrilateral Project, big townships, sea port, nuclear power station, chemical industries. There are few case studies which will more helpful to understand the reality.

Case Study N0. 1 Konkan Railway Project

Konkan Railway Project HIA was one of the successful example of HIA in India. It was the most difficult project for railway to complete, proposed in late 19th century and completed in late 20th century.

Historical Background: It was challenging task to construct railway line in malaria prone area of Konkan terrain. The area associated with major outbreak of malaria causing high morbidity and mortality in work force. Therefore it causes delay in completion of project and increase the high financial burden.

Indian history has such example, which will prove that lack of HIA projects was delayed and cost was increased. A survey had done in 1900, for railway line Liang-Biang (Indi-China), the results of survey had shown that in a small period of 8 months 80% mortality in natives and 77% in Europeans.

Konkan Railway Project in western coast of India was proposed project in late 19th century. All tentative survey completed one century ago, but because of difficult terrain and climatic condition, could not built until 1977, when a 65km stretch was completed between Apta and Roha. British government avoided that project due to heavy coast, difficult geographical and environmental condition. It was the biggest railway project of 20th century in Indian sub-continent. KR project is recognized a marvel work in civil engineering, because almost impossible 760km railway project (from Roha to Mangalore), was completed in small period of 7years.

The Konkan Terrain: The entire coastal belt is known for the seasonal heavy rainfall and high humidity throughout the year. There are four climatic season in the year summer, monsoon, post monsoon and mild winter. These all conditions are most favorable for mosquito breeding and malaria transmission in villages, towns and railway colonies all along the tracks.

KR Project Major Works: There were 71 tunnels in all over the projects and covers 75km (11%) of the total project. Including all small and big bridges (approximately one in every 4.2km) covers almost 27km of the KR project. The earth work covers the major portion 627km (84.8%), it included cutting of hills and embankment for laying tracks. The project includes 56 railway stations and designed in a way that they merge with the ambience with the Konkan region.

Note: Environment Impact Assessment (EIA) Report was made by Rail India Technical and Economic Service (RITES) India Ltd. There was no specific impact made about mosquito-borne disease potential due to project activities. That report created condition to conduct independent HIA especially with regard to malaria.

HIA in KR Project: Two teams were constituted for initiating HIA, for first step one team for parasitic surveillance to assess the stimulating cases of malaria infection in migrated workforce for project. Second team was for conducting vector surveillance and to record observation of water stagnation points near the major and minor construction sites, it includes pipes culverts, bridges, box culverts, tunnels, stations, staff quarters, yards, sleeper curing tanks, labour camps, septic tanks etc.

Challenges for HIA: There were basically two challenges to prevent and control the malaria in Konkan region. One was to identify the problem arising from the construction workers and to advise remedial measures. And the second was to ensure the mosquito breeding eliminated on the long term basis and supervise field work.

Objective of HIA: Prevention of the mosquito breeding by eliminating the mosquito genic condition, indigenous transmission of malaria and other mosquito-borne diseases along the Konkan railway track.

Strategy for HIA: There were four strategies followed to consultation with Konkan Railway management and other stakeholders. (1) The first target was health impact assessment of all workers working in Konkan Railway project. (2) Selection of cost effective and environmentally sustainable intervention. (3) Concentration of public relation, develop team work with the KR, constructor, communities and staff of the NIMR. (4) Monitor the HIA progress through entomological and parasitological indices.

Major findings of HIA: During the HIA for KR project entomological and Parasitological survey was done. There are following findings from survey which are mentioned below:

Entomological Survey: An entomological survey was conducted for entire 106 km of Goa region of the project to detect the water

stagnant points in the area where mosquito breeding can occur. The NIMR team was included entomologist, engineers, draftsmen and field workers to access the water stagnation sights in project area. Engineering drawing was made for water stagnation sights, and suggested correction to ensure prevention to water stagnation and mosquito breeding. Altogether small and big 581 sites were visited for inspection includes tunnels at extension sites, major and minor bridges, pipe culverts, box culverts, stations buildings, staff quarters, sleepers manufacturing plants, septic tanks etc. from these all 80 were diagnosed positive for mosquito breeding.

Parasitological Surveys: Team from NIMR and medical officers of directorate of health survey Goa visited all the 23 sites under the construction such as bridges, tunnels, embankment, and sleeper construction plants. During that survey 706 construction workers were examined, out of that 706 workers only 36 were the natives of Goa, 5 were from Nepal and remaining 665 was migrated from other states of India. This survey depicted that out of 706, five were suffering from malaria.

Advised engineering works: There are following examples of advised engineering works-

1) Sloping roof of station and residential quarters. (2) All the overhead tanks on stations and residential quarters must be mosquito proof. (3) Anti mosquito septic tanks and soak pits at staff quarters and stations. (4) Making concrete drainage along the railway line and drainage availability to cutting section near the mouth of the tunnel. (5) All railway stations and coach washing yards with efficient drainage system. (6) After the construction of all bridges and tunnels, proper demolition of water tanks used for work. (7) Continuation of clearance of mud/silt from the mouth of pipe, railway line drainage and box culverts to ensure smooth water flow. (8) To stop the water stagnant near the major bridges, filling up the depressions. (9) All big tanks for sleeper curing either filled and leveled or repaired and converted to carnivorous fish hatcheries. (10) Re-useable fiber glass, plastic food trays/cups introduced in the trains.

Cost Profile of HIA: The complete HIA for 760km Konkan Railway project was completed by using Rs. 4.566 million, which was only less than 1% of the entire project.

Reward: The all KR project (760km) was completed without any outbreak of malaria epidemic or other vector-borne diseases.

Case Study No. 2 Transport and Land Use in Delhi (HIA)

Delhi is capital city of India, and known for its geographical condition, population, development, different districts, surrounding towns etc. Its development policies and project have many health impacts on its residents. It is interesting that the failure to consider the health impact may result from transport and land use effects more on lower class people. So it means that the lower class people were been neglected during the policy making. Such type of polices promotes the adverse health impact on large section of the population. The study on transport and land use in Delhi shown that.

Historical Patterns: From 1874, the planned development was started for Delhi when Delhi Municipal Committee was formed. In the year 1910, British Government appointed a town planning committee to plan an empirical city in Delhi. Till the 1955-57, Town Planning Organization and Delhi Development Authority slow down the unplanned development in Delhi. In 1962, Town Planning Organization made a master-plan for Delhi development. This plan made a good space for industries in Delhi development. For planned development government followed that master plan, and the low class people resettled from middle part Delhi to outer areas in colonies.

That master plan for Delhi was supposed, which included that each and everyone must participate. But the planning was limited to some government people and

technical experts only there was no role for people to play. Therefore few people had exploited the DMP. The result of that misuse is noticed here. Green belt of DMP exploited by land developers. The resettlement residential colonies are submerging with Industrial area. Because of that the nearby cities like Gurgaon, Faridabad, and Ghaziabad are continuously urban sprawl. Especially Gurgaon's highways and national highways are so congested and making condition for highest accidental cases city of Haryana. As per the study, 1500 unauthorized colonies settled with any civic amenities with 60% of substandard living population like in juggi, jhopri.

Land Use: Like other cities Delhi also follows the mixed type of land use. Central part of city comprise with commercial development as well as residential infrastructure. And for these commercial area forth class worker, house maids and other worker who are migrated from rural areas started living nearby empty land, near railway lines etc.

Because of industrial development a large number of employments were provided and this attracted a larger population from rural area which also motivated unauthorized colonies without civic amenities. Delhi development produced 215000 jobs in 1971 to 1136000 jobs in 1999. Along with this even some informal workers like newspaper distributer, vegetable venders, dhobi, chai walla etc. also joined in unauthorized colonies.

Traffic Pattern: Due to the fast commercial and industrial growth, motorized vehicles also increased faster. Survey had shown that from 6:00 pm to 9:00pm roads will be full with vehicles, hours traffic jam will be there. Traffic is expending day by day with commercial development, but there is no space remaining to expand the roads. And a large number of population which is living in unauthorized colonies, road side, railway line side etc. still depend on walking or cycling for traveling to work places. There is no separate provision for heavy vehicles, cars, motor bikes, bicycles etc. which creates more accident prone condition.

Health Impact: A large number of populations in Delhi are migrated from rural area and neighbor states. People from the villages came with hope of employment and high income, but because of acute scarcity of housing and infrastructure people compelled to stay in unauthorized colonies without basic amenities. The living condition of these people is so pathetic with water scarcity, no drainage facilities, no health facilities etc. this resulted towards them to fall prey of several kind of illness, and increased health issues.

Delhi's hug traffic is producing high air pollution, noise pollution and increasing traffic accidents which are increasing extra burden on health services.

Therefore we can say that Delhi development have lot of negative health impact which would have avoided.

Challenges in HIA

Time: Time is a persistent issue in assessing a policy. Always, there is no sufficient time available to undertake HIAs. This is partly due to the rapidity with which conclusions are made once a proposal is detailed enough to assess. That rapidity can be negative for HIA quality.

Identifying Potential Impacts: Method used to identify potential health impacts in HIA includes the literature reviews, key informant interviews, stakeholder workshops, analysis of options and scenarios. Though these methods are suitable, the challenge for HIA is to boost the rigor of the methods used though still remaining timely and appropriate to decision-making.

Summaries of Evidence: Summaries of evidence helped in several HIA, qualifying the assessors to reliably classify and predict possible impacts in a timely manner. This highlights the need for complex summaries of the health impacts of a variety of activities. These summaries are not required on issues where already information is available, but necessary in various other issues.

Health Equity: Considering the dissemination of impacts is a feature of many of the HIA case studies, though this mainly takes the form of considering at the impacts on Indigenous groups. While essential, this fails to meet the least criteria for considering variance impacts within HIA in terms of Age, Gender, Socioeconomic position, Culture and ethnicity, Location disadvantage, Existing levels of health and disability.

Conclusion

HIA is a very strong equipment to improve positives of policies, power project, industrial project, townships and infrastructure development project by assessing the possible negative health impact on workers, community or population and intervene to eliminate negative health impact to enhance the positive impact. A good and adequate use of HIA in KR project, made it more easy and successful without putting negative impact on public health. Another side Delhi development master plan becomes negative for public health. It was not assessed on the health impact parameter now the condition is worst, and that is the big challenge for our capital city. Neglecting the health implementing development projects are not sensible, if public is unhealthy then for whom development. Merely going towards development is not enough; we need sustainability and public health for true development.

EIA is mandatory for every project in India, but it is lacking in health assessment area. There is not a single project for which EIA proposed to conduct HIA. Literature is showing that our country have preparedness for adopting HIA, but it is taking long time for that which may lead to negative public health.

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