

A Systematic Review on Evidence Based Policy Making and effectiveness in the Perspectives of Environmental Pollution in Nepal

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Abstract

It is high time to analyze and find the policy gaps and adequacies focusing on environmental pollution and the functionality of policy instruments as the issue of environmental pollution are growing day by day in Nepal and throughout the world. In this context, the question arises why policies are generally not transformed into action in Nepal. The systematic review method was adopted for the relevant literature review and PRISMA reporting tool for the article writing. It is observed that there are many barriers to evidence use such as reliability, replicability of the study time required to develop evidence, lack of evidence use culture and coordination between research organizations and policy making institutions, and vested interests, etc. Amidst the mentioned barriers there are some prospects as well, the tool like evidence to decision has been developed and the system of co-production of evidence among researchers and policy makers has been found more effective in the UK. The governments in the international arena particularly the developed countries are becoming evidence friendly for their policy formulation for example: the USA, UK, Australia, etc.

In addition, there are now robust, transparent and reliable methods for conducting comprehensive evidence syntheses, for example systematic reviews including others. But, creating policies based on evidence is a complex and challenging process. As a result, institutionalizing evidence based policy making remains a significant challenge in many developing countries, including Nepal. Environmental pollution policies need to be supported by appropriate policy instruments with economic incentives for their effective implementation. Policy effectiveness or successful implementation of the policy depends on appropriate institutional arrangements with adequate human and financial resources. The concerned evidence-based knowledge on Nepal scenario in this aspect is found very few. It may be due to lack of research on the pertinent subject. So, a vast knowledge gap on environmental pollution policy formulation process and their effectiveness persists in Nepal.

Key Words: *Barriers to policy use, evidence based policy, policy effectiveness, policy instruments, prospects of policy use*

1. Introduction

Environmental Pollution is becoming more pressing issue in Nepal as well as in the world. Air and water pollution, solid waste management and lands intoxication are rising due to various reasons. Air pollution exceeds safety limits across the cities of developing countries in Asia according to the Health and Environmental Index (HEI). Harmful gas emissions and particulate matter from transporting vehicles, various industrial and other human activities contribute to the air pollution. In fact, urban population is exposed to pollution in rising trends and consequently there are increasing cases of respiratory diseases and cases of cancer (Pullin et

al., 2022). Access to clean air is vital for the health of human and living beings and plants. It is evident that access to clean air mostly determines human health, and the overall life condition of other living beings as well as plants.

The waste in Nepal is continuously disposed either in water bodies or in open areas within cities, impacting the public health and environment harmfully by contaminating ground and surface water, clogging storm water drains and ponding water creating the condition of insect breeding and floods sometimes. The rampant burning of waste significantly contributes to air pollution in the urban area and surrounding soil, and water bodies

are polluted by the leachate from the waste dumps (Sanderson et al., 2002). Thapathali is found to be the most polluted section, which exceeds the carcinogenic heavy metal such as Arsenic. Both the WHO and national generic effluent standards are exceeded by most of the parameters (Baniya et al., 2019).

The industries and transport vehicles that are the basic drivers of economic growth continuously, since around the last century have made a severe contribution for growing ambient air pollution. Besides, the indoor air pollution is due to lack of proper cooking and ventilating amenities such as improved cooking stoves specifically in the rural areas of developing countries (Howes & Wyrwoll, 2012). Air quality monitoring network of the government shows that the Kathmandu Valley readings exceed $40 \mu\text{g}/\text{m}^3$ and most stations in the Terai are far higher (World Bank, 2025).

Najam's policy analysis protocol of 5C (Najam et al., 1995) gives the high prospect as it is in practice worldwide for the policy analysis related to environmental policy in the perspectives of environmental pollution in Nepal. South Asia is home to 9 of the world's 10 cities with the worst air pollution, which causes an estimated 2 million premature deaths across the region each year and results in significant economic costs (World Bank, 2022).

Environmental Performance Index (EPI) framework, 2018 that consist of the Environmental Health Index (HLT) indicating air and water quality along with heavy metal exposure and the Ecosystem Vitality Index (ECO) indicating biodiversity and climate change shows overall performance of the environment with respect to the said indices. Asia has relatively low performance with the second lowest EPI score among other continents of the world, only slightly higher than the sub-Saharan Africa. Asian EPI of 50 is lower than that of world average 56 (Huang & Xu, 2019).

In this context, environmental pollution related public policies in the form of general policy or laws are the aspiration and commitment of the concerned governments to address the public issues. However,

such public policies need to be evidence based and effective to meet their objectives. Similarly, it is evident that whim or interest driven fact-less policies may lead to corruption and favoritism at the end. Politicians may use such policies formulated without evidence for corruption and elections favoring opportunities for them (Shah et al., 2021).

Plewis points a definition of policy relevant evidence in two such as in the first part, evidence for the selection of effective policy options; and the second is evidence from implementation evaluations that help guide for decisions for maintaining, amendment, or improvement of the policies concerned. That also enriches the broader evidence base for future policy decisions (Huang & Xu, 2019).

Application of Environmental Instruments (EIs) has achieved wider political acceptability in a rising trend; they have been accepted as incentive rather than only revenue collecting tools (Organization for Economic Development and Corporation, 1994). Evidence-based policymaking will work only when institutions encourage inquiry-driven approaches and are ready to use research evidence for decision making (Banks et al., 2009).

So, it is highly desirable to study on evidence based policy and its relevance for turning policy into action and make them effective in the perspectives of environmental pollution in Nepal. In this context, it is very pertinent to study why policies generally are not transformed into action? Therefore, this systematic review aims at finding the existing knowledge base on this issue and finding the prevailing gaps.

2. Material and Methods

The Research Question was formulated so that it helps find Scoping Search. It was confirmed with swift search engines like [Google Scholar](#) or any other so that the exact question has not already been answered by an existing previous review. A Review Protocol was developed. All intended search strategies, exact eligibility rules, data criteria, and analytical paths were documented before beginning the formal review in a methodical and

planned way. Eligibility or screening criteria were set up with strict inclusion and exclusion limits such that non relevant literatures would be avoided and there would be saving of time and effort as well. The major criteria were publication date ranges: After 2015 except for very relevant ones, language: English, geographic constraints: Covering all the regions of the world, and accepted study designs: closely relevant to the research question.

Public registration: the finalized plan was not submitted to a registry such as the Open Science Framework (OSF) as the probability of duplication was almost nil. A comprehensive literature search was carried out with database selection: At least three comprehensive academic databases relevant to the study discipline such as Relevant Government Institutions, Policy Research Institute, Research gate etc. were identified.

The risk of bias was assessed generally with the mixed method appraisal tool (MMAT) version 2018. The risk of bias while selecting the literature was minimized by developing the key words with Boolean operators for the search and assessing whether the literature of concern is suitable for the intended review based on the checklists like its subject relevancy, to give the example such as evidence based policy making, policy effectiveness and environmental pollution principles and policy instruments, etc., date of publication, geographical region etc. It also ensures quality assessment of the review.

The relevant data were extracted and organized for further analysis. The data and important narrative items were synthesized and findings were analyzed (Philip & Barker, 2021). The article was prepared with differentiated relevant policy area wise subheadings as found in the review. The Results were interpreted and the Report was prepared based on PRISMA 2020 Statement (Page et al., 2021)

Limitation of this Review: As this review tries to explore the situation of evidence-based policy making perspectives and their implementation in general in the selected international arena and in Nepal, thorough policy analysis is out of the scope of this review. The flow diagram of PRISMA is given in Figure 1.

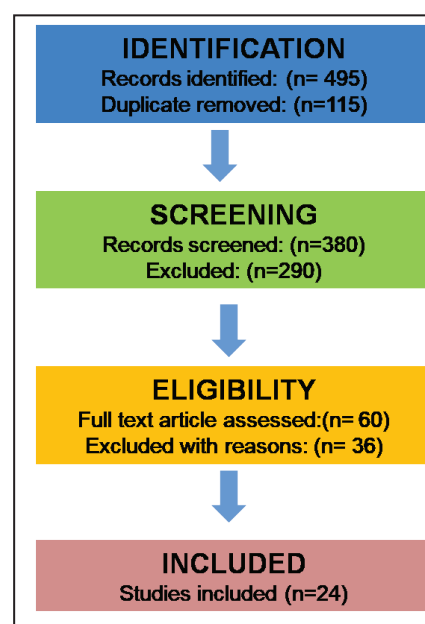


Figure 1: The flow diagram of PRISMA

3. Results and Discussion

3.1 Results

The results of the review on evidence-based policy making in the perspectives of environmental pollution in Nepal with various regional countries in the world are presented in the following theme points with short descriptions. The number of articles reviewed, and their categorization and policy areas are as illustrated in Table 1.

Table 1: Policy area wise articles differentiation

S.N.	Type of articles/Reports	Number of articles
1	Evidence based policy making	5
2	Environmental policy	1
3	Environmental/Policy instruments	2
4	Policy Implementation	9
5	Science and practice of evidence syntheses	4
6	Others	3
Total		24

Evidence Based Policy Making: Evidence-based policy making is getting attention as it helps determine what policy interventions work best, for whom, and under which conditions. This approach is based on the fact that effective policies could be achieved by understanding how different policy interventions affect social systems to produce changes desired (Pawson & Tilley, 1997). However,

evidence-based policy making has many barriers and prospects, too as mentioned in the referred literature that are institutional capacity, evidence use culture etc. are stated onwards.

Barriers to Evidence Use: Evidence used for policy formulation has many barriers among lacking evidence using culture, reliability and replicability of the evidence itself and process of evidence generation whether it is participatory with the evidence users, for example the political leaders and the senior bureaucrats, and the other users of the policy programs and so on. However, it is observed that not all evidence gathering studies are robust, and they can introduce and create bias. Moreover, individual empirical studies may vary in validity. The replication problem in science is because a paper published cannot be confirmed that its conclusion is surely valid. Despite the scientific research community assuming peers reviewed science as a valuable thing for policy formulation, but it is rarely considered most important source of information and not used widely in practice for environmental decision making (Cooke et al., 2023).

Elements of Barriers to Evidence Use: It is argued that the most common barriers to environmental evidence use in decision-making are as follows:

- a) accessibility of the evidence,
- b) relevance and applicability of the evidence,
- c) organizational capacity,
- d) financial and other resources,
- e) time required to find evidence,
- f) Poor communication and dissemination between scientists and decision makers (Cooke et al., 2023).

Diminishing Public Confidence with the Political and Scientific Leaders: A remarkable decline in public confidence is observed in both political as well as scientific authorities across numerous democratic countries in the recent decades. This erosion of trust among the public is mostly due to growing populism, rising political divides, cultural conflicts, the rise of anti-establishment activism, and the influence of social media widespread across the world. Ethical considerations in research are critical, especially when evidence syntheses are

used to guide policy decisions. These syntheses are assumed to reflect the broader population accurately. However, if they are based on non-representative or biased primary studies, the risk of misrepresenting the interests of key stakeholders may rise as its effect (Cooke et al., 2023).

Increased Uncertainty due to Constructivist Approach and Public Reviews: Constructivist approach in epistemology has introduced a sense of uncertainty due to the variability of knowledge depending on the situation; it challenges the traditional foundation of evidence-based policymaking itself (Hudson et al., 2019). Despite these critiques from constructivist and postmodern approaches, the goal of creating more informed policies through reliable knowledge always remains relevant and important (Sanderson, 2002). Public reviews conduction of policy initiatives is not a simple job. They have to face various criticisms regarding their content, methodologies and evaluation rigor etc., even after incorporating the public views in their evaluation reports (Banks, 2009).

Panta notes that shifts in a country are ruling political party's ideology is cause of corresponding changes in economic policies, globally. However, frequent government changes due to various reasons results in policies being short-term only that aims at influencing public opinion and election votes that prevent long-term, evidence-based economic strategy and planning (Panta, 2023). The barriers to the evidence use are summarized below in Figure 2.

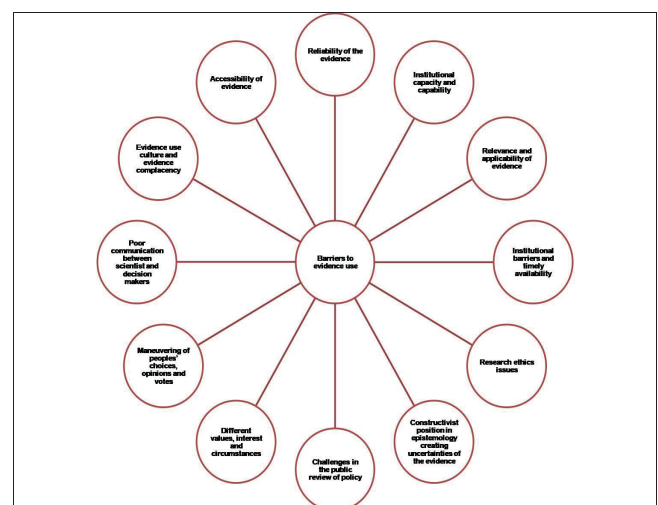


Figure 2: Barriers to Evidence Use

Prospects of Evidence Use: As there are barriers there are prospects of evidence use as well. Following statements from the reviewed literature highlights this aspect. Evidence Based Policy Decision Tools and other Prospects : Nevertheless, there are prospects of the evidence use in policy formulation as many tools have been developed for it, the governments in the international arena particularly the developed countries are becoming evidence friendly for their policy formulation for example: USA (United States of America), UK (United Kingdom) and Australia etc. In addition, there are now robust, transparent and trustworthy methods for evidence syntheses (i.e., systematic reviews, although other evidence syntheses are also adoptable depending on their use) that can reduce risk of bias (Cooke et al., 2023).

There has been development of new tools to address the challenges in decision-making like Evidence-to-Decision (E2D) tool (www.evidence2decisiontool.com). This tool provides a way to practically follow a clear, structured and transparent way and provide evidence used in decision making. Collins and colleagues state that UK policymakers found that collaboration between review experts and policy makers can enhance both evidence syntheses and their application in decision making in practice (Cooke et al., 2023). The prospects of evidence use are summarized below in Figure 3.

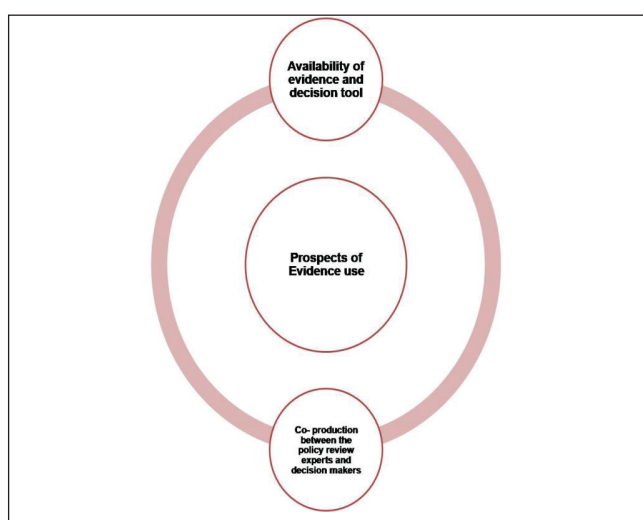


Figure 3: Prospects of Evidence Use

Policy Effectiveness: Policy effectiveness or successful implementation of the policy is desirable

to the attainment of its objectives. Besides, appropriate institutional arrangements with adequate human and financial resources are vital for successful policy implementation. Policy effectiveness analysis is carried out to test whether the policies are effective. Regarding policy effectiveness, there are observations of the authors as stated below.

Policy Evaluation and Accountable Government in international Arena: It is important to hold governments accountable through policy action evidence of enhancement of public sector effectiveness such that it demonstrates results, indicating government actions are producing desired outcomes. Secretary of State Blunkett notes that research plays a vital role in formulating effective strategies, clarity of their processes and improving the quality and responsiveness of public policies (Sanderson, 2002).

In the UK, professional policy making emphasizes the need for policymakers to acquire new competencies such as economics, statistics, and relevant scientific fields for dealing with the critical assessment and acquiring complex policy evidence (Sanderson, 2002). However, thorough evaluation and systematic review of policy have not been widespread in practice, specifically in social and environmental areas compared to that in economic ones (Banks, 2009).

Studies have found that failure of governments in Australia to collect adequate data to assess the effectiveness of their own programs that may be elsewhere, too. There has been insufficient effort to establish the baseline data necessary for meaningful before-and-after policy intervention comparisons (Banks, 2009). The elements of policy effectiveness are summarized below in Figure 4.

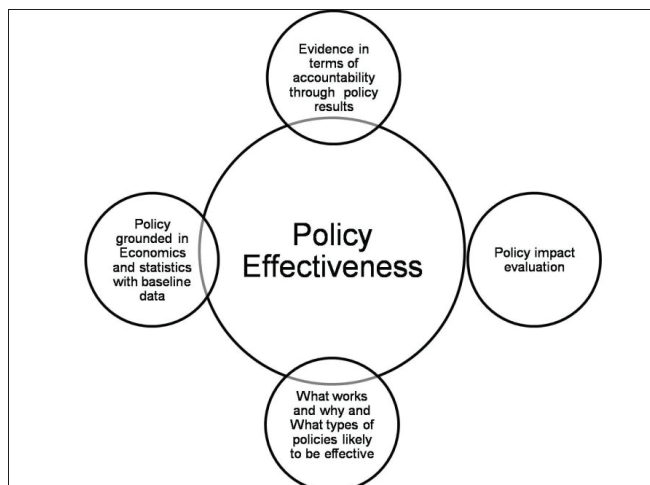


Figure 4: Policy Effectiveness

Evidence based Policy Making Status in Nepal

Present Scenario: Evidence-based policy making in Nepal is still at its initial stage. While awareness and concerns is growing with civil society demands, pressure from the intellectual circle also increases. However, the national policy process generally relies on top-down assumptions and ad hoc political rhetoric. However, initial draft preparation, stakeholder consultation and concerned institutions like National Planning Commission, Ministry of Law and Justice, Ministry of Finance and other concerned Ministry or Departments are consulted in the process of draft policy preparation or final consent. Moreover, public opinion through digital media is also growing these days.

Challenges: Lack of Evidence use culture, inadequate research culture and grassroots data, political or other favor group interests, inadequate institutional capacity, conflicting laws, inadequate resources, ad hoc planning culture, lack of policy and project evaluation system etc. The following observations indicate the gloomy picture of the environmental effectiveness in Nepal.

Prospects: Focus of the Government in science, innovation and research can be taken as a positive ray of hope for research culture and evidence-based policy making. Similarly, Think Tank institutions like the Nepal Institute for Policy Research (NIPoRe), universities and research centers and the Governance Lab etc. are generating evidence-based debates to fill the gap between research and decision-making (Panta, 2023).

Najam's Policy Analysis Protocol of 5C for Environmental Pollution in Nepal: It would be appropriate to analyze the policy of concern or environmental pollution related policies in Nepal with existing widely used model, for that purpose Najam's policy analysis protocol of 5C (Najam, 1995) can be adopted as it is in practice worldwide. The 5C Protocols and their examples are given onwards.

1. Content of the policy or define the problem and objectives.

Problem statement: e.g. Specify pollutants(s) of concern (e.g. $PM_{2.5}$, PM_{10} , SO_2 , NO_x), exposure hotspots (Kathmandu Valley, Terai), and seasonality data. Objectives: Health risk reduction (e.g. reduce annual $PM_{2.5}$ by X%), equity (protect vulnerable groups), economic efficiency (cost per $\mu g/m^3$ reduced), compliance with WHO and national guidelines.

2. Context of the policy or select policy of concern.

Statutes and policies: Environment Protection Act 2019 (EPA 2076), National Environment Policy 2019, Solid Waste Management Act 2011, National emission Standards, WHO standard for river water or National Standards for Industrial effluent etc. Programs and finance: Projects related to industrial emissions reductions via electrification, emission controls, local and provincial plans etc. Institutions: Ministry of Agriculture, Forests and Environment/ Department of Environment, Provincial concerned Ministries, Municipalities etc.

3. Commitments: Establish baseline data and trends

For example, air quality levels: Compile recent $PM_{2.5}$ means and exceedance days by city; note WHO guideline exceedance and seasonal peaks. Following are the examples of cases of environmental pollution in Nepal for this purpose. Sources: pollution shares e.g. for air pollution from transport, industry, residential biomass burning, construction dust, open waste burning, cross-border inflow and wildfires, etc. Health and economic burden of pollution: Mortality/morbidity estimates and GDP loss

share; identify sensitive groups and high-exposure occupations from pollution.

4. Capacity: Institutional capacity to implement the policy and related programs

Diagnosing why pollution persists: weak enforcement capacity, limited monitoring capacity, slow electrification, finance and electric vehicle use policy etc. Implementation reality: Contrast on rhetoric and reality in de jure policy provisions and standards versus de facto practice;

5. Clients and Coalition actors concerned with the policy of concerns. Define evaluation criteria for analyzing effectiveness.

Effectiveness: Expected reduction in affected population with weighted PM_{2.5} etc. Cost-effectiveness: Cost per µg/m³ reduced, payback for adoption of cleaner technology. Equity: Benefits for low-income and high-exposure groups in affected regions and seasons. Feasibility: Administrative capacity, political acceptability and financial and other viability. Co-benefits/risks: Climate mitigation, energy security, industrial competitiveness (Najam, 1995). The elements of Najam's 5C Policy Analysis Protocol are shown below in Figure 5.

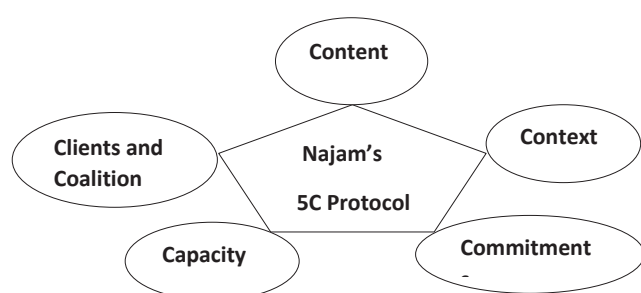


Figure 5: The elements of Najam's 5C Policy Analysis Protocol

Policy Instruments for Environmental Pollution

The policies need to be supported by appropriate policy instruments; they may be in the form of command and control, market-based instruments, or voluntary community participation. Economic incentives of various types are provided to implement these instruments. The observations of the authors in the literature concerned are given below.

Command and Control: Command-and-control or regulating instruments are the oldest tools used in environmental policy (Rittberger & Richardson, 2003). Despite the introduction of many new approaches, these traditional instruments still play a significant role in formulating environmental policies. These are indeed the policy provisions like banning littering of waste, allowing only treated industrial effluent with set standard parameters and household sewage to rivers and water bodies, to have green stickers with the vehicles etc. and consequent punishments to the defaulters.

Market Based Instruments: Market-based tools rely on economic incentives to drive compliance. These incentives can be categorized as positive (like subsidies), negative (such as Eco-taxes or waste disposal fees), or a combination of both (for example, deposit-refund systems). Many scholars consider these economic approaches to be more effective than mandatory regulations. However, these instruments are rarely practiced in Nepal

Voluntary Instruments: Voluntary instruments are associated with the willingness of individuals and organizations to act without compulsion. These tools are relatively recent additions to environmental policy (Rittberger, B. & Richardson, 2003) and (Howes & Wyrwoll, 2012). These instruments for example waste collecting fee is partially practiced in many municipalities in Nepal

Communicative Instruments: These instruments deal with spreading knowledge and raising awareness through public information campaigns, educational programs, and workshops aimed at informing citizens and stakeholders about environmental issues (Eckerberg, 1997). These instruments are in practice through television, radio and digital social media platforms etc.

Institutions: Effective environmental policy requires resourceful institutions for implementing policies into practice. The Centre for Management and Policy Studies within the Cabinet Office of the UK government to serve as a central hub for research and evaluation is the best example towards this approach (Pawson & Tilley, 1997). In this aspect, Institutions in Nepal are generally weak.

3.2 Discussion

Formulating policies based on evidence is not an easy job because of the problem of reliability and replicability of the evidence(s), resources needed to generate them, lack of confidence of the policy makers e.g., political Leaders and senior bureaucrats, decision culture and capability and so on.

Evidence-Based Policy Making and Challenges:

The importance of a science-based policy as it rarely leaves any room for policy manipulation by different interest groups, politicians or so forth for their vested interest (Shah et al., 2021).

Making policies based on evidence is a challenging process. There are many barriers such as reliability and reproducibility of data, limited resources for generating quality evidence, lack of trust among policymakers like politicians and senior officials, and inadequate capacity and culture for evidence. So, institutionalizing evidence-based policy making remains a significant challenge in many developing countries, including Nepal.

However, unlike Nepal and developing world country like the United States has legal infrastructure in place for transforming evidence into policy by enacting the Foundations for Evidence-Based Policy Making Act in 2018, followed by executive actions aimed at encouraging federal agencies to prioritize evidence-building based on science and data (Cooke et al., 2023).

Contextual Barriers of Evidence Use: Evidence is not sought out often and so underutilized in decision-making, even in the case it is readily available, and the effects of policy implementation are mostly not studied, too. The research studies show that even if decision makers recognize the importance of quality evidence syntheses, they are not easily accessible to them when sought for a specific policy issue. There are institutional obstacles that may obstruct the process of integration of evidence synthesis into decision-making system (Cooke et al., 2023).

Factors Influencing Evidence Use: Policy decisions are not just made by empirical data or rational analysis but they are also affected by values,

interests, and personalities of the decision makers including timing and chance. Banks argues that policy making does not occur in isolation, it arises amid political pressures, lobbying, and vested interests (Banks, 2009). The reliability of policy-related evidence while formulating policy is also a matter of concern that many evidence syntheses lack the quality needed to effectively support policy decisions as shown by recent study findings (Page, 2021). There geerally remains knowledge gap in environmental decision-making of a clear understanding of type, source and validity of the evidence of concern at deciding state vis a vis which evidence to use, and how much weightage to be allotted to them by decision makers (Cooke et al., 2023).

Reasons for Policy Failure: Over expectations, implementation in weak governance, inadequate collaborative policymaking, and the uncertainty of the political cycle are major factors of policy failure (Hudson et al., 2019). Political leaders often prioritize their personal agendas and electoral promises over objective evidence. However, it is observed that many existing evidence syntheses lack methodological rigor and transparency, such that they can be hardly replicated or even trusted for planning and implementation stages (Page, 2021).

Policy analysis is found underdeveloped, relying mostly on stakeholder consultations that often reflect personal opinions and vested interests in place of objective evidence in Nepal (Panta, 2023). Environmental policy suffers from many issues such as failing to incorporate cross-cutting themes, political interference, inactive advisory bodies, poor implementation of policy institutions and inadequate resources (Devkota, 2011). Newly adopted federal democratic system of Nepal has resulted in inconsistent and poorly coordinated policy making, often with unstructured and ad-hoc decisions (Shah et al., 2021). Policy failures in Nepal can be attributed to weak policy formulation, poor inter-agency coordination, weak institutions, inadequate resource allocation, and lack of systematic evaluation.

Evidence-based Policy Prospects of Nepal: Nepal has recently started embracing participatory

decision-making though in fragmental basis on the understanding of the senior decision makers involving stakeholders such as experts, users, and NGOs. Nonetheless, the effectiveness of a policy ultimately depends on its outcomes. If it fails to deliver, it should be revised promptly. For successful implementation, supportive mechanisms such as appropriate instruments, competent institutions, sufficient resources, and user trust are essential.

Policies need to be understood as knowledgeable guesses made using the best available information during the process of formulation. Evaluation of policy implementation is crucial for learning their workability and if not the underlining reasons there for future improvements (Panta, 2023). A review study of Australia's waste management policy revealed that the aim of achieving zero solid waste was expensive and environmentally unsustainable as well. Institutions must nurture a culture of research and unhindered learning if they are with evidence-based approaches (Banks, 2009).

Research Finding to Policy Making: Even though various tools and strategies for transforming evidence into decision-making have emerged, their success depends significantly whether researchers or evidence producers collaborate directly with policymakers. Similarly, a strategy that promotes the exchange of knowledge between distinct relevant groups called boundary spanning concept from organizational management was introduced in the 1970s (Cooke et al., 2023). Connecting researchers or evidence producers and users to ensure that research findings are applicable in practice for decision-making is important in environmental policy sector. Increased mentorship and skill development training is desired to cultivate a culture that always values the use of evidence for decision making Producing evidence syntheses merely is not of much use unless understanding how they are used within the broader environmental management system for evidence-based practice of decision making (Cooke et al., 2023).

Policy Effectiveness: Any policy to be effective needs to perform well with proper implementation of its policy provisions through programs and

projects. The policies have not been working properly in Nepal due to not addressing policies on cross-cutting issues, continuous interference by political parties, the failure to function by national advisory bodies properly, the negligence of policy institutions to put policies into practice, and on the top of that, lack of adequate human and financial resources. The following are the examples of environmental policy effectiveness in Nepal. Out of more than 130 EIA documents very few are implemented fulfilling basic criteria effectively. The monitoring, evaluation and auditing system of EIA was almost neglected, resulting in weak performance (Devkota, 2011).

Air Pollution Context: The WHO has set ultimate target for annual mean PM_{2.5} concentration as 5 µg/m³, with an initial interim goal of 35 µg/m³ for encouraging incremental progress (World Health Organization, 2021) whereas, the national standard limit of 40 µg/m³. However, to achieve these benchmarks there needs the urgency and scale of effort to address air pollution in areas like the Kathmandu Valley and the Terai, where current pollution levels significantly exceed this safety limits (The World Bank, 2025).

River Water Pollution in Bagmati River

The BOD level as specified in the national generic standard for industrial effluent is 50 mg/L, and that in the WHO standard for portable water is 6 mg/L. These levels exceeded in all sampling sites of Bagmati River. In addition, Gairigaun and Tilganga section contained the BOD level 30 times more than the given standard. The less urbanized areas such as Sundarijal and Gokarneshwor also exceeded the specified standard that clearly indicated organic pollution in the river. Except Sundarijal and Gokarneshwor all sampling sites contained more COD than the WHO standard (10 mg/L) and standard for the national industrial effluents (250 mg/L) (Baniya et al., 2019).

Solid Waste Management

The household waste collected is transported by vehicles and disposed off finally to the selected areas prescribed by local bodies. The disposal sites are mainly Landfill, riverbanks, depressed land/

dumps, open pit, or temporary open piles (Maharjan et al., 2019). It matters whether the policies work or not, the observation of the UK on this issue is highlighted as stated in the lines hereafter. There is a need to strengthen the evidence base through long-term impact assessments of policy initiatives for program evaluation (Pawson & Tilley, 1997). This is in conformity with the UK government's slogan: what matters is what works (Sanderson, 2002).

Environmental Policy Instruments

Policy instruments particularly for environmental pollution such as command and control, market-based instruments, voluntary instruments and communication instruments need to be adopted in the policies concerned to make them effective. However, they are found to be minimally adopted in practice in Nepal.

Institutions and Federal Government Perspectives

Institutions for experimentation and evaluation are vital to foster adaptive governance and social learning (Sanderson, 2002). However, institutional strength is generally weak with inadequate human and other resources and other working environment. The relevant institutions in Nepal was restructured after introduction of federalism when many important institutions were curtailed or removed and as the provincial and local government institutions are still struggling to develop their performing capacity. Environmental pollution aspects are still to be mainstreamed in the government business.

Learning for Nepal from Developed Countries

Nepal can learn from the developed countries like USA, UK, and Australia etc. in following aspects of evidence-based policy making and effectiveness in the perspectives of environmental pollution. Develop legal infrastructure and strong institutions like Environmental Protection Agency (EPA) for it as in the USA. Establish or provide mandate to core agency to NPC, Cabinet Secretariate (as in the UK) or the Ministry of concern for it. Adopt principles and policy instruments in the concerned policies. Implement the policy provisions of concerned laws mandatorily. Establish or strengthen universities

and research institutions (as in Australia) with adequate resources needed for the evidence-based policy making and evaluation of the policy implementation.

3. Conclusions

The articles reviewed gave good insights on evidence-based policy formulation and mechanism for desired effectiveness in general. The concerned articles on Nepal scenario are found very few and recent picture with evidence (data) could not be available particularly for evidence-based policy formulation. It may be due to lack of research on the pertinent subject. So, a vast knowledge gap on environment policy formation process and their effectiveness is found from this article review process. In this respect, it is high time that researchers particularly with enriched practical experiences on it needs to be inspired and promoted by the government through appropriate research institutions or universities with the research grants. Further, the close connection between research institutions and the government or even private organizations needs to be established through research grants from the concerned agencies, however particular research needs to be on the institutional need basis only.

However, adoption of evidence-based policy making is very important to avoid policy of political and other vested interests, to make them strategic and effective or action oriented improving their quality and in turn, to meet the aspirations of the people as envisaged by its objectives.

The governments in the developed world are in that direction but many developing countries including Nepal is yet it to realize it. Even though the evidence needs to be reliable and replicable, moreover, it needs to be easily available and have trust of the policy makers and the users so that it is generated transparently with scientific methods. Even though there are numerous barriers for evidence-based policy making, there are prospects as well if we adopt digital technology platforms in this new era.

Adoption of proper policy instruments and principles, appropriate institutions with adequate

human and financial resources are needed to implement them effectively or to make the policy effective. Policy program evaluation system is yet to be institutionalized in many developing countries including in Nepal that needs to be started with.

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5. Author Contribution

The main author contributed to reviewing, analyzing the relevant articles and writing of the draft manuscript. The corresponding and co-authors supervised, writing reviews and editing. All authors have read and approved the final version of the article.

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