

Article

A comparative study of analgesic efficacy of buprenorphine and fentanyl as an adjuvant with bupivacaine in open cholecystectomy under thoracic epidural anaesthesia

Ismeet Kaur¹ Sushma Choudhary^{1*}, Ranjana Singh², Supriya Awasthi³ and Meera Dhuria⁴

¹ Ph.D Scholar, Noida International University, Public health, Noida, India, 201310

² Department of Community Medicine, Noida International University, Public health, Noida, India, 201310.

³ Department of Public Health, Noida International University, School of allied health sciences, Noida, India, 201301.

⁴ Joint Director, Department of Epidemiology, National Centre for Disease Control, Delhi, India, 110054.

* Correspondence: s.choudhary@safetynet-web.org

Received: 1 January 2023; Accepted: 8 February 2023; Published: 28 February 2023.

Abstract: Background: The non-communicable diseases (NCDs) contribute to 68% (38 million) of deaths globally and can be held responsible for 60% (5.87 million) of morbidity rate in India. The Ministry of Health and Family Welfare has presented an alarming report, reflecting upon the rapid health transition due to the rising burden of NCDs in India. To understand that, NCDs encompass a vast group of diseases such as cancer, diabetes, cardiovascular diseases (CVDs), and Chronic respiratory diseases.

Material and Methods: A literature search was performed on PubMed using keywords, NCD programs, NCD policies, NCD prevention, India, NCD burden, Control of NCDs, NCD management. Boolean operator 'AND' was used. These combinations produced 360 results. Firstly, based on year of publication, papers published after 2014 were included while others were excluded. Search results for 277 papers. Another filter 'full text and free' was applied and 37 search results were obtained. Abstracts and titles of remaining search results were assessed based on prior established inclusion-exclusion criteria and the search result further narrowed to 5 papers.

Results: NCD accounts for 62% of the total deaths thus, accounting for 48% of the overall mortality rate. Leading cause of NCD, induced mortality, has been reported due to chronic respiratory diseases, diabetes, cardiovascular diseases, cancer, endocrine diseases, and urogenital blood. The detailed analysis of Non-Communicable Diseases (NCDs) in India highlights significant barriers to NCD care, including gaps in policy implementation, social determinants of health, and challenges in health promotion. These findings underscore the need for comprehensive strategies to address NCDs effectively.

Conclusion: States with higher NCD burden also reflect better healthcare response as well as infrastructure. NCD burden varies among rural and urban areas with a huge difference in NCD promoters amongst population. Urban areas face higher NCD burden due to poor lifestyle choices, drug dependence while the rural areas face comparatively lower NCD burden; however, it exists due to lack of education, selectively available health care services and lack of early detection.

Keywords: NCDs, diabetes, hypertension, CVDs, NPCDCS

How to cite: Ismeet Kaur, et al.,(2024). Effectiveness of Non-Communicable Disease (NCD) Programs Concerning NCD Burden in India. Int. Aca Res J.Inter. Med&Pub.Health; Vol5; Issue2: page no 01-08

1. Introduction

H health is a national subject concerning the well-being of the population. Availability to the health services could be a major dependent, considering the current national health status of India. Nethan, Sinha and Mehrotra, (2017) mentioned that non-communicable diseases (NCDs) contribute to 68% (38 million)

of deaths globally and can be held responsible for 60% (5.87 million) of morbidity rate in India [1]. The Ministry of Health and Family Welfare has presented an alarming report, reflecting upon the rapid health transition due to rising burden of NCDs in India. It would be essential to understand that, NCDs encompass a vast group of diseases such as cancer, diabetes, cardiovascular diseases (CVDs) along with other chronic respiratory diseases (CRDs). The spectre of NCDs looms over India's current health horizon, which is evident from current morbidity and mortality rate [2]. It is to be considered that NCDs do not possess any specificity towards age groups; therefore, they can affect economically productive adult age groups as well as the elderly.

However, the risk factor resides concerning the identification of NCDs in the early stages because some of them are asymptomatic, with the result that some of the suffering individuals do not even seek care and rest are missed by the system due to poor implementation of the health plans. Cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases are the four NCDs, which have been held responsible for total NCD morbidity and mortality on a global scale (World Health Organization – WHO) [3]. It is to be considered that the majority of NCD related deaths occur in middle and low-income countries such as India because these nations are undergoing an epidemiological health transition towards urbanization. This ongoing transition might have led to an overall economic rise, but accompanied with flip sides or risk factors.

There have been numerous behavioural as well as biological risk factors identified by the World Health Organisation (WHO), with a predisposition to NCD development. Risk factors include alcohol and tobacco consumption, overweight population, obesity, physical inactivity, low or high blood pressure, diabetes, and cholesterol levels [3]. NCD associated morbidity leads to considerable loss concerning the potential productive years of life, and losses due to premature deaths are projected to increase in India, due to prior presented risk factors.

The Government of India has implemented numerous health programs and health initiatives in order to control the projected rate of NCDs. The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) was launched as a subsidiary initiative of the National Health Mission (NHM) in 2010. NPCDCS focused majorly upon strengthening human resource development, nation's infrastructure, early diagnosis, health promotion along with the referral and management. National Programme For Control Of Blindness & Visual Impairment (NJCBI), National Mental Health Programme (NMHP), National Programme for healthcare of Elderly (NPHCE), National Programme for the Prevention & Control of Deafness (NPPCD), National Tobacco Control Programme (NTCP), National Oral Health Programme (NOHP), National Programme for Palliative care (NPPC), National Programme for Prevention & Management of Burn Injuries (NPPMBI) and many other NCD Programmes have been launched and implemented [2].

Diabetes, cancer, and cardiovascular diseases are the major group of NCDs affecting a major group of population in India irrespective of the age, economic status, and other social factors. Despite the implementation of numerous health plans concerning NCDs, very little information is available concerning the effectiveness of these programs. Therefore, this systematic review paper will aim to identify major NCDs health programs across the nation and, efforts will be made to enlighten the implementation of health programs in India.

2. Material and methods

This systematic review focuses upon effectiveness of NCD programs on NCD burden in India. For this systematic review, data concerning national or state-level NCD control programs was collected. Collection of data was performed, in order to determine the impact or effectiveness concerned with the implementation of NCD programs at state and national level. Likewise, effectiveness of NCD programs implemented after 2010 was considered as a major inclusion criteria. Further, only studies or data available from India was considered. Data collection strategy majorly focused upon literature available online.

Therefore, extensive literature search was performed on PubMed using keywords such as, NCD programs, NCD policies, NCD prevention, India, NCD burden, Control of NCDs, NCD management. Boolean operator 'AND' was used to combine the proposed keywords in possible combinations. These combinations produced 360 results and these search results were filtered. Firstly, based on year of publication, papers published after 2014 were included while others were excluded. This narrowed the search result to 277 papers. Likewise, another filter 'full text and free' was applied and 37 search results were obtained. Abstracts and titles

of remaining search results were assessed based on prior established inclusion-exclusion criteria and the search result further narrowed to 5 papers, which were included in this systematic review.

Moreover, in order to increase the significance of this paper and expand the area of analysis, recent data and surveys based on implementation of government NCD policies were included. Therefore, Google and other reliable websites such as Indian Council of Medical Research (ICMR), National Health Mission (NHM) and Ministry of Health and Family Welfare Government of India (MOHFW) were referred and the papers were filtered based on prior established inclusion-exclusion criteria.

2.1. Inclusion

- Papers focusing only on NCD policies
- Full text available
- Review papers on NCD policies implemented by government
- Papers focused only upon existing NCDs

2.2. Exclusion

- Papers Focusing on specific NCD
- Papers not based on India
- Papers focusing upon NCDs due to communicable diseases.
- Papers published before 2014.

3. Literature Review

Non-communicable diseases do not spread from person to person rather; they possess a long incubation period. Therefore, early detection, identification or diagnosis of these diseases might not be possible, as they do not present symptoms during the early stage. Main types of NCDs are diabetes, stroke, cancers, heart diseases and chronic respiratory diseases. NCDs have been reported to contribute towards 60% mortality rate in India where, Diabetes (3%), Cancers (12%), chronic respiratory disease (22%) and Coronary Heart Disease, Stroke, and Hypertension led to 45% of deaths. One of the essential aspects to consider is the fact that, before 2010, India lacked an integral NCD programme. However, there were other programmes, which were running parallel and catering to various aspects of NCDs such as, National Mental Health Programme, National Cancer Control Programme, and National Tobacco Control Programme [4]. Dandona (2017) inferred the 'Global Burden of Disease Study' conducted on state wise analysis of the disease pattern in 2016. NCDs have been reported to cause an increase in Disability-Adjusted Life Years (DALYs) from 30% to 55% in 2016 [5]. Goa, Kerala, Himachal Pradesh, Tamil Nadu, and Punjab were reported to be the states with highest epidemiological transition ratio. Major risk factors leading to prevalence of NCDs were increased blood pressure, unhealthy diet, increased cholesterol, raised blood sugar and overweight individuals. Likewise, the 2016 report also presented tobacco use responsible for 6% of the overall disease burden in India.

NCD burden and prevalence of related risk factors have been reported to be higher in urban areas of India. Further, in the majority of the states, NCDs go unreported due to lack of clinical symptoms, poor lifestyle choices and unaware population [6]. Therefore, the Ministry of Health and Family Welfare (MOHFW) considered primary care as the best avenue for delivering the required NCD care in the most comprehensive and integrated way. The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS) was merged with National Health Mission (NHM) in 2013; thus, aiming towards integration of NCD-related programme activities such as, early diagnosis, health promotion, referral, and treatment. However, until now there exists no effective model, which can demonstrate the prior mentioned integration. There were numerous limitations associated with the implementation of this integrated strategy as it lacked a proper action plan, a comprehensive information pool along with a management information system required to monitor the reach and implementation of the programme.

NPCDCS was initiated in 10 Indian districts during its pilot phase; however, in 2010 it was scaled to 100 districts of 21 Indian states. The services included promotive, curative, supportive and preventive services for NCDs such as cancer, diabetes, and stroke at various government health facilities. Moreover, there existed provisions to cover more diseases under NPCDCS such as chronic renal diseases and chronic lung diseases. Further, the idea of cohesion between district hospitals and private laboratories along with

NGOs was promoted. The cohesion was promoted because it would have aided in providing components of continuum care along with support required for outreach services.

Furthermore, integration of new components to NPCDCS such as 'Ayushman Bharat' reflects upon the Indian government's efforts towards continuous improvements to the existing NCD policy. 'Ayushman Bharat' scheme was based on two major pillars, which were identified as major lacking aspects from initially implemented NPCDCS. These pillars advise the strengthening of primary healthcare and implementation of a health insurance scheme covering more than 500 million individuals across India. The Government of India proposed the establishment of 150,000 health and wellness centres all over the country to ensure comprehensive primary healthcare services, which would help to deal with NCDsm [7].

However, it would be essential to consider that, before 2013 no monitoring framework, targets or indicators existed, which could track and monitor the progress of NCD programs. Therefore, the Indian government adopted 'The National NCD Monitoring Framework' in 2013, which included 10 targets and 21 indicators to monitor and track the progress of NCD plans from 2020 to 2025 (Table -1).

Table 1. National Monitoring Framework with Targets of NCD Prevention and Control in India until 2025.

	Framework element	Targets		
		Outcome	2020	2025
1	Premature mortality from NCDs	Relative reduction in overall mortality from CVDs, cancer, diabetes, or chronic respiratory disease	10%	25%
2	Obesity and diabetes prevalence	Halt in rise in obesity and diabetes prevalence	No midterm target set	Halt in rise in obesity and diabetes prevalence
3	Physical inactivity	Relative reduction in prevalence of insufficient physical activity	5%	10%
4	Raised blood pressure	Relative reduction in the prevalence of raised blood pressure	10%	25%
5	Salt/sodium intake	Relative reduction in mean population intake of salt with the aim of achieving recommended level of less than 5g per day	20%	30%
6	Alcohol use	Relative reduction in alcohol use	5%	10%
7	Tobacco use	Relative reduction in prevalence of current tobacco use	15%	30%
8	Drug therapy to prevent heart attacks and strokes	Eligible people receive	30%	50%
9	Essential medicines and basic technologies to treat major NCDs	Availability of essential NCD medicines and basic technologies to treat major NCDs public/private facilities	60%	80%
10	Household indoor air pollution	Relative reduction in household use of solid fuel as primary source of energy	25%	50%

Source:- Thakur, Paika and Singh (2020) [4]

Building a successful NCD program entails an understanding concerning the current barriers all over the NCD care spectrum. This might include but not limiting from knowledge risk factors amongst disease control. A recent study concerning NCD burden in Indian slums directed towards the need to address casual pathways of NCD risk in slums embracing the distinction of direct from indirect causes. Likewise, the study presented a multidimensional relation between social determinants of health and NCDs structured around four themes namely low education, scarce clean water, transportation and physical (in) activity. Slums represent living situations, which can be implemented to a large Indian population if aligned with the lens of poverty. However, the social determinants identified are applicable to citizens not residing in slums [8].

Mere integration of policies and planning cannot be considered as the director of effective implementation. Strengthening of primary health care being one of the pillars of 'Ayushman Bharat' lacked did not consider the availability of frontline healthcare workers in rural and urban areas. As per government norms, accredited social health activist (ASHA) has been allocated per 1000 population in rural areas; however, this cadre is allocated for a population of 2500 in case of urban areas for vulnerable and marginalized communities (Pati, Swaroop, Karet al 2020). Further, ASHA workers have been reported to lack the required handholding support in the community and are overburdened by multiple tasks assigned to them, some of which are out of their scope [9]. ASHA workers are expected to perform the function of educator, link worker, service provider and activists alongside; thus, affecting their NCD screening abilities from a huge number of individuals assigned to them.

One of the striking findings from 'AYUSH BHARAT' has been noted from the less developed states of India. Higher burden of COPD in the less developed states of north India were reported due to high exposure towards ambient and household air pollution. Therefore, COPD associated fatality rate was reported to be

twice as high compared to more developed states. Further, aging is another major factor contributing towards increased burden of NCDs. NCDs arising due to ageing follows a different trend than the other causative factor and current NCD prevention and management policies have failed to target this aspect.

Pati et al (2020) [6] reflected on the availability of oral drugs, which varied pan India such as, Glibenclamide (anti-diabetic drug) availability varies from 100% in Karnataka to 3.8% in West Bengal).

Uprising rates of NCD burden need to be addressed not only because of health aspects rather economic losses to the nation. India is a developing country with multispectral growth initiatives from various industries and foreign investments; therefore, NCDs emerge as an anchor concerning growth and draining nation's funds. Dramatic increases in disability-adjusted life year rates between 1990 and 2016 have been reported by India state-level Disease Burden Initiative directing towards two specific NCDs - ischemic heart disease and diabetes. Risk factors identified from the prior mentioned initiative includes alcohol, tobacco consumption, malnutrition, and lack of physical activity. If left unaddressed these NCDs could be responsible for an economic burden of approximately US\$ 3.55 trillion on the Indian economy by 2030.

4. Results and Discussion

Non-communicable diseases (NCDs) are responsible for the death of 41 million individuals annually i.e., 74% of all deaths globally. Statistics present that 15 million of these deaths are premature and 85% have been reported from low and middle-income countries. NCD accounts for 62% of the total deaths thus, accounting for 48% of the overall mortality rate. Leading cause of NCD, induced mortality has been reported due to chronic respiratory diseases, diabetes, cardiovascular diseases, cancer, endocrine diseases, and urogenital blood [10].

One of the major requirements for India, concerning implementation of effective NCD policy and control over NCD burden, is to collect adequate country level data. The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) launched by the Government of India with a focus on health promotion, human resources, early diagnosis, treatment, and referral. However, the design and implementation of this national health policy reflects gaps, which can be addressed through the integration of country level data.

4.1. Economic status and availability of health services

A recent study focused upon the socio-economic health disparities in India from the past two decades presented a lack of attention towards socio-economic disparities in health system responsiveness. Thus, the difference in responsiveness might intensify the existing socio-economic inequality concerning primary health care access. This is of a major concern because about 80% of India's population is dependent upon private health facilities due to their quality care [11]. Only the poor individuals have been reported to use public health facilities and this poor responsiveness have been reported to be a key reason concerning underutilization of primary healthcare facilities. Education, income, and transport are undermining factors, which have been found lagging from current NCD policies in India.

4.2. Social determinants of Health as carriers of NCDs

NCDs might be considered as non-communicable from a biological disease carrier perspective; however, a clear understanding of social determinants of health can reflect upon the carriers of NCD. Growing empirical evidence from the study reflects that slums are the locales of NCDs, where slums can be considered as the living condition characterised by inadequate access to sanitation, safe water, poor housing structural quality, overcrowding and insecure residential status. It would be essential to consider that the prior presented characteristics apply to the majority of India's population individually or collectively. Further, these characteristics needs to be considered as the social determinants of health (SDH) because they provide clear understanding of disease by incorporating the influence of behavioural, socio economic, social, and environmental factors (Lumagbas, Coleman, Bunders, Pariente, Belonje& de Cock Buning, 2018). Therefore, health policies concerning NCD should be majorly based upon SDH of the specified region. Cultural norms or macroeconomic policy factors such as drug dependence or physical inactivity are lagging from the current NCD policy framework; thus, limiting the implication of policy for a large percentage of the Indian population.

4.3. Need for root cause analysis

Policy monitoring and evaluation are critical concerning strategic planning and effective implementation. Program or policy monitoring helps to track answers for questions initiating with What? Where? and when? Monitoring can help with the assessment of work done as intended, however; it fails to answer the aspects related to effectiveness or ineffectiveness of the program. Current NCD policies in India lags monitoring and evaluation aspects, which are essential for continuous improvement and up gradation of the program. NCDs being a multisectoral disease would require data collection that might be beyond the healthcare sector. There is a requirement of extensive root cause analysis research and studies before policy planning and implementation. This is majorly because India pertains to diversity in cultures, socio-economic status, education levels, gender, resource availability and awareness [12].

NCD policy implementation has been a lagging aspect. As evident from the study, reported from over 151 countries, not even half of WHO-recommended NCD policies is implemented [13]. Therefore, implementation research should empower local communities concerning the health service delivery. Moreover, research agendas should be shaped by regional priorities and regional capacities, in order to address the knowledge gap between policy planning and implementation at ground level. Inculcation of better understanding of local needs, engaging communities along with the implementation of a system-based approach could improve health service delivery and policy development.

4.4. Need for collaboration of government programs and align to pool resources

The NPCDCS program initiated and implemented by the Indian government can be considered as a signalling effort towards NCD control. However, funding for research and evidence-based programmatic efforts need priority. Moreover, it would be a necessary aspect for the government of India to collaborate with private as well as semi-private health care providers concerning the healthcare delivery approach for NCDs. Therefore, having an established research agenda to guide researchers and funding would allow the stakeholders as well as healthcare providers as well as the local communities to develop collaborative research, which could help in NCD burden reduction.

4.5. Need for health promotion

As stated, and noted from the nature of disease, non-communicable disease is not contagious i.e., the spread of disease is not dependent upon other individuals. Therefore, this makes it easier to control and manage the disease through health promotion. Health promotion enables individuals to have better control on themselves; thus, inducing health improvement. Above presented literature clearly indicates the fact that the majority of NCDs exist because of poor lifestyle habits, poor health choices and lack of education concerning early detection of disease. Therefore, health promotion aims to engage and empower individuals as well as adjacent communities to make choices that reduce the risk of chronic disease development. Current health promotion strategies are fragmented in India and teachings of health promotion are limited to health education and communication [14].

Unlike other countries, India has not been able to make best use of digitalization in the healthcare sector. Affordability of internet services as well as connecting devices such as mobile phones can be considered as effective tools for health promotion. The World Health Organization suggested that control of risk factors, which promote NCD development, is one of the most important aspects concerning morbidity control from NCDs. Therefore, the Government of India needs to inculcate health promotion as an effective and essential implementation tool in current as well as upcoming NCD policy.

5. Conclusion

NCD burden and response have been observed to vary widely across states in India. States with higher NCD burden also reflect better healthcare response as well as infrastructure. Likewise, NCD burden varies among rural and urban areas with a huge difference in NCD promoters amongst population. Urban areas face higher NCD burden due to poor lifestyle choices, drug dependence while the rural areas face comparatively lower NCD burden; however, it exists due to lack of education, selectively available health care services and lack of early detection. Current NCD policies in India mainly include a broad spectrum NPCDCS, which does not fill the prior discussed gap. NPCDCS and other NCD policies have not been able to reduce NCD burden

in India due to limited scale of implementation. The Government of India needs to reconsider the policy making and implementation process. There is a dire need of data collection from all over the nation before setting any other policy framework for NCD burden. Further, an integrated and comprehensive approach is required, which focuses on health promotion, research-based interventions, prevention of exposure towards risk factors, inclusion of SDH, empowerment of the local authorities, early diagnosis along with improved capacity for management of rising NCD burden in rural as well as urban areas.

Ethical approval and consent to participate: Not applicable **Consent for publication:** Not Applicable
Availability of data and materials: Not applicable **Competing interests:** No Competing interest **Funding:** Not applicable **Author's contributions**

	Ismeet Kaur	Sushma Choudhary	Ranjana Singh	Supriya Awasthi	Meera Dhuria
Concept	√	√	√	√	
Design		√	√		√
Definition of intellectual content	√	√	√	√	√
Literature search	√	√	√	√	√
Manuscript preparation	√	√	√		√
Manuscript editing	√	√		√	
Manuscript review	√	√	√	√	√

Acknowledgement: Not applicable Abbreviations **ASHA:** accredited social health activist

COPD: Chronic Obstructive Pulmonary Disease

CRDs: Chronic Respiratory Diseases

CVDs: Cardiovascular diseases

DALYs: Disability-Adjusted Life Years (DALYs)

ICMR: Indian Council of Medical Research

MOHFW: Ministry of Health and Family Welfare Government of India

NCDs: Non communicable disease

NHM: National Health Mission

NMHP: National Mental Health Programme

NOHP: National Oral Health Programme

NPCDCS: National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke

NPCBVI: National Programme for Control of Blindness & Visual Impairment

NPHCE: National Programme for healthcare of Elderly

NPPC: National Programme for Palliative care

NPPCD: National Programme for the Prevention & Control of Deafness

NPPMBI: National Programme for Prevention & Management of Burn Injuries

NTCP: National Tobacco Control Programme

SDH: social determinants of health

WHO: World Health Organisation

Conflicts of Interest: Write conflict of interests or write "The authors declare that they do not have any conflict of interests."

References

- [1] Nethan, Suzanne, Dharendra Sinha, and Ravi Mehrotra. "Non communicable disease risk factors and their trends in India." *Asian Pacific journal of cancer prevention: APJCP* 18.7 (2017): 2005. <https://doi.org/10.22034%2FAPJCP.2017.18.7.2005>
- [2] Ministry of Health & Family Welfare. National Programme for Prevention & Control of cancer, diabetes ... - NHM [Internet]. National Health Mission. Government of India; 2023. Available from: <https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=1048;lid=60>

- [3] World Health Organization. National multisectoral action plan for prevention and control of non-communicable diseases [Internet]. World Health Organization. World Health Organization; 2017. Available from: <https://apps.who.int/ncd-multisectoral-plantool/>
- [4] Thakur, J. S., Ronika Paika, and Sukriti Singh. "Burden of noncommunicable diseases and implementation challenges of National NCD Programmes in India." *medical journal armed forces india* 76.3 (2020): 261-267. <https://doi.org/10.1016/j.mjafi.2020.03.002>
- [5] Dandona, Lalit, et al. "Nations within a nation: variations in epidemiological transition across the states of India, 1990–2016 in the Global Burden of Disease Study." *The Lancet* 390.10111 (2017): 2437-2460. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)32804-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32804-0/fulltext)
- [6] Pati, Manoj Kumar, et al. "A narrative review of gaps in the provision of integrated care for noncommunicable diseases in India." *Public Health Reviews* 41 (2020): 1-16. <https://doi.org/10.1186/s40985-020-00128-3>.
- [7] Bhargava, Balram, and Vinod K. Paul. "Informing NCD control efforts in India on the eve of Ayushman Bharat." *The Lancet* 399.10331 (2022): e17-e19. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32172-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32172-X/fulltext)
- [8] Lumagbas, Lily Beth, et al. "Non-communicable diseases in Indian slums: re-framing the Social Determinants of Health." *Global health action* 11.1 (2018): 1438840. <https://www.tandfonline.com/doi/abs/10.1080/16549716.2018.1438840>
- [9] Saprii, Lipekho, et al. "Community health workers in rural India: analysing the opportunities and challenges Accredited Social Health Activists (ASHAs) face in realising their multiple roles." *Human resources for health* 13 (2015): 1-13. <https://link.springer.com/article/10.1186/s12960-015-0094-3>
- [10] Kataria, Ishu, et al. "A research agenda for non-communicable disease prevention and control in India." *Health Research Policy and Systems* 18 (2020): 1-7. <https://link.springer.com/article/10.1186/s12961-020-00639-0>
- [11] Malhotra, Chetna, and Young Kyung Do. "Socio-economic disparities in health system responsiveness in India." *Health policy and planning* 28.2 (2013): 197-205. <https://academic.oup.com/heapol/article-abstract/28/2/197/760006>
- [12] Krishnan, Anand, et al. "How to effectively monitor and evaluate NCD programmes in India." *Indian Journal of Community Medicine* 36.Supp11 (2011): S57-S62. https://journals.lww.com/ijcm/fulltext/2011/36001/how_to_effectively_monitor_and_evaluate_ncd.10.aspx
- [13] Allen, Luke N., et al. "Implementation of non-communicable disease policies: a geopolitical analysis of 151 countries." *The Lancet Global Health* 8.1 (2020): e50-e58. [https://www.thelancet.com/article/S2214-109X\(19\)30446-2/fulltext](https://www.thelancet.com/article/S2214-109X(19)30446-2/fulltext)
- [14] Pati, Sanghamitra, et al. "Health promotion education in India: present landscape and future vistas." *Global journal of health science* 4.4 (2012): 159. <https://doi.org/10.5539%2Fgjhs.v4n4p159>



© 2024 by the authors; licensee iARCON, Assam, India. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).