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Hidden Threats, Preventive Efforts, and Resolving Non-Communicable Diseases among Soldiers in Nepal

“An ounce of prevention is worth a pound of cure” - Benjamin Franklin

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Abstract

Non-communicable diseases (NCDs) represent unrecognized threat to military personnel, causing premature mortality and disability. Previous research showed that NCDs in Nepali Army includes cardiovascular diseases, diabetes, mental health disorders and exertional heat related illness. Risk factors are linked to modifiable lifestyle behaviors and military service-related exposures. Studies reveal alarming prevalence rates: 13.4% hypertension, 25.27% major depression, and increasing metabolic disorders among serving soldiers. NCDs compromise operational readiness, increase medical costs and impact overall welfare of soldiers. Interventions targeting behavioral changes and comprehensive prevention strategies are critical. This research employs mixed method approach incorporating the research analysis of qualitative data and quantitative data collected through published articles in national and international journals to assess epidemiology and its way forward to prevent NCDs in Nepali Army. Nepali Army policymakers and Nepali Army Medical Corp need to understand the growing burden of NCDs among soldiers and implement targeted strategies to protect their health and avoid premature mortality in the Nepali Army.

Keywords

Behavioral risk factors, Nepali Army, Non-communicable diseases, Operational readiness, Preventive efforts

Introduction

Medical conditions which are not transmitted from person to person are termed as non-communicable diseases (NCDs) and they usually progress slowly over extended periods.

According to population based household survey in Nepal, hypertension, diabetes and dyslipidemia are considered common NCDs followed by chronic respiratory illness, cancers, musculoskeletal disorders, kidney diseases, mental health disorders, neurological disorders, temperature-driven disorders, etc. (Dhimal et al., 2019). Although NCDs affect all nations, there has been a surge in NCD prevalence in low middle income countries (LMICs) recently due to various behavioral, metabolic and environmental risk factors (Peters et al., 2019). In fact, two third deaths due to NCDs are occurring in LMICs (Piovani et al., 2022). As NCDs are on rise in civilian population, military personnel are no different. Nepali Army, with approximately 90,000 active personnel, is experiencing increasing NCDs incidence, mirroring global trend.

Detection of NCDs among soldiers could be done with systematic health screening like routine health assessment, nutritional intervention, lifestyle modifications, and mandatory physical fitness tailoring to NCD risk reduction. Similarly, preventive strategies like campaigning to address behavioral risk factors such as tobacco use, excessive alcohol consumption, and sedentary lifestyle during non-active duty periods, and poor dietary choices need to be implemented within military settings.

The integrated clinical care pathways including drugs and lifestyle modifications along with continuous monitoring provides effective resolving measures for NCDs. Long-term disease management must take consideration of challenging military services like operational readiness, deployment readiness, and career growth.

Objective

This descriptive review was conducted with aim to comprehensively study NCDs among soldiers in the Nepali Army to synthesize evidence on hidden threats, preventive strategies and resolving approaches for NCDs.

Methodology

This study employs mixed method approach, combining qualitative (perceptions of risk for NCDs, barriers to health care access, stressors unique to military services) and quantitative research data (NCD burden, prevalence rates, risk factor distribution and health outcomes). NCDs among soldiers require both understanding of disease prevalence

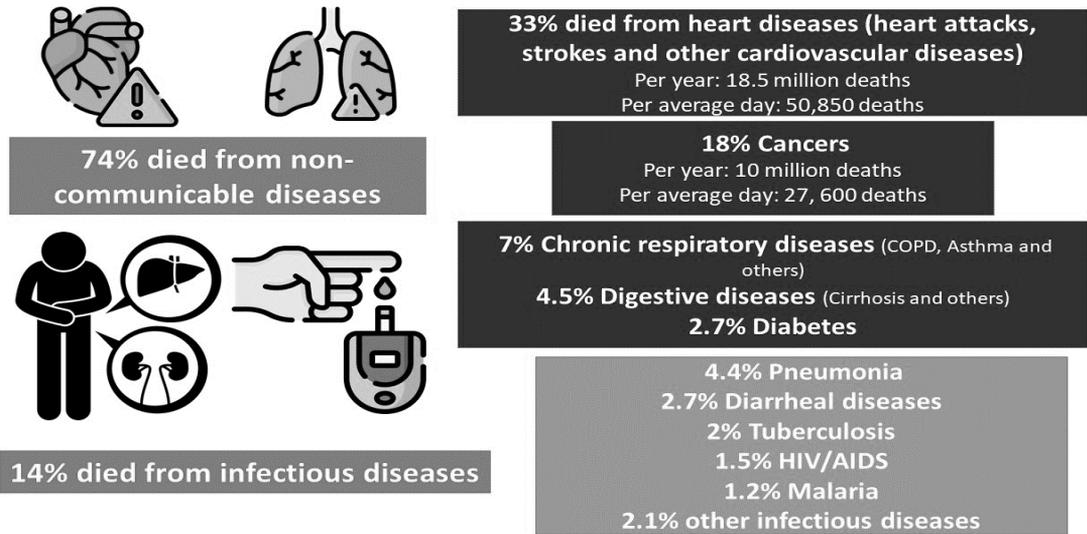
and contextual insight into behavioral, occupational, and cultural factors that drive these complexities, necessitating employing mixed-method approach. This descriptive review article is based in desk study, utilizing secondary data from journal articles, reports and online resources. This paper adopts non-systematic approach with analyses because literature on NCDs specifically within Nepali Army context is limited and scattered across diverse sources including health reports, gray literature, government documents and regional studies which would be excluded by systematic review protocols.

Epidemiology of NCDs

Over recent decades, NCDs, also referred to as chronic diseases, have risen as the “invisible epidemic;” 74% of global deaths in 2019 were from NCDs compared to 14% from infectious diseases (Dattani et al., 2023). Report from UK in 2018 mentioned that military personnel developed life-threatening cardiac arrhythmias due to structural heart disease which often go unrecognized and lead to sudden cardiac death despite undergoing intensive endurance training (Khan et al., 2018). The leading cause of death among NCD is heart diseases (heart attacks, strokes, sudden cardiac death, and other cardiovascular disorders) followed by cancers and chronic respiratory diseases (Dattani et al., 2023) (Figure 1).

Figure 1

Global Burden of Disease



Source: Dattani et al., 2023

Not only NCDs are prevalent in developed countries, but also LMICs accounts for 82% of the premature deaths attributable to NCD, a call to global action (Ezzati et al., 2018). The majority of NCD deaths in 2021, which was not associated with pandemic were caused by cardiovascular illnesses, followed by cancer (10 million), chronic respiratory conditions (4 million), and diabetes (more than 2 million, including deaths from kidney disease brought on by diabetes) (Belayneh et al., 2024; World Health Organization, 2023).

In Nepal, around 66% of all deaths in 2016 were attributable to NCDs (Dhimal et al., 2019). The studies conducted in Nepali Army reported increased NCDs among serving soldiers at an alarming rate. A cross-sectional study conducted among 416 Nepali soldiers across four army barracks found prevalence of hypertension and pre-hypertension of 13.4% and 37.3% respectively (Budhathoki et al., 2020). Similarly, a screening study among 850 Nepali soldiers selected for United Nations (UN) peacekeeping mission found that 5.6% had hypertension, with 64.9% being newly diagnosed cases requiring antihypertensive medication (Khatrri et al., 2017). Furthermore, study conducted in 2018 observed that Nepali Army recruits suffered with exertional heat related illness (EHRI) had modifiable risk factors (Shrestha et al., 2018). Another study on the prevalence of mental disorders among serving soldiers reported major depression (25.27%), alcohol dependence (25.58%) and schizophrenia (14.67%) as three most common mental disorders (Rawal et al., 2012). Though there is need of further studies on NCDs in Nepali Army, published literature provide evidence of increasing prevalence of NCDs within the army subpopulation.

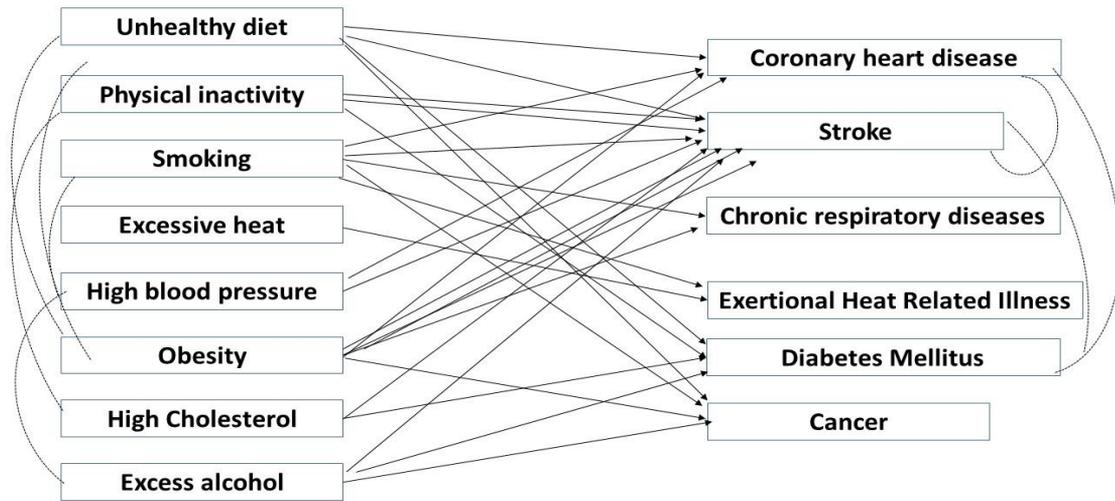
Nepali Army has provided anecdotal evidence of deaths of Nepali soldier during UN posting which was attributable to cardiomyopathies and atherosclerotic diseases. As Nepali Army, the top-most troop contributing country to the UN mission, with increase in NCDs and premature mortality impacts not only the individual soldier but limits the UN deployment while requiring increased medical evacuation. Similarly, NCDs not only have significant impact on military readiness but also affect real lives and careers.

Risk Factors of NCDs

There are multiple risk factors which interplay and act synergistically to develop NCDs. The risk factors are categorized into behavioral, metabolic and environmental factors, along with military service related risk factors. The relationships between established risk factors and NCDs are shown in figure 2.

Figure 2

Diagram showing the reported relationships between established risk factors and NCDs



Source: Peters et al., 2019

Behavioral Risk Factors

It includes tobacco use (active and passive smoking, chewing tobacco), unhealthy dietary patterns (high salt, red meat, sugar, saturated fats, junk foods, aerated drinks, etc.), alcohol consumption, excessive strenuous exercise and sedentary life styles, etc. (World Health Organization, 2023). These risk factors are modifiable and often interconnected with one another amplifying the likelihood of chronic diseases.

Metabolic Risk Factors

The behavioral risk factors directly contribute to metabolic pathways leading to raised blood pressure (hypertension), overweight and obesity, elevated blood glucose (diabetes) and abnormal blood lipids (dyslipidemia) (World Health Organization, 2023). These metabolic risk factors are also associated with lifestyle factors and sometimes are identifiable only through active screening for blood glucose and cholesterol, in the absence of levels which may be severe when symptoms occur.

Environmental Risk Factors

It includes air pollution from indoor and outdoor sources, climate change and deforestation as well as soil pollution due to agro-chemicals and pharmaceutical wastes.

The intersection of environmental degradation and urbanization attributes to the development of stroke, ischemic heart disease, cardiomyopathy, chronic respiratory illness, lung cancer and even some mental disorders (World Health Organization, 2023). The environmental risk factors are more common and are disproportionately exacerbating NCDs in LMIC like Nepal.

Military Service Related Risk Factors

Military personnel (soldier) go through threshold level of physical activity during recruitment, mandatory physical training, medical screening and functions within the health promoting military policies, for these reasons they have been considered healthier than civil counterparts. Recent studies suggested military service as one of the gateway to NCDs.

Evidence from various international studies showed that 68% of active-duty soldiers were overweight or obese, 27% were smokers and 18% were hypertensive (Almond et al., 2008; Hooks et al., 2015; Budhathoki et al., 2022; Gravina et al., 2013). Soldiers typically consume excessive tobacco and alcohol compared to civilian counterparts, behaviors that may be driven by the occupational stress (active duty hour demands), peer influence and military culture, easy availability and high acceptance contribute directly to NCDs. In addition, military messes have provision of standardized meals which may be high in salt, sugar and saturated fats, field duty personnel often rely on processed, canned foods. Overall, calorie-dense rations with limited fruits and vegetables during deployment and training compromises nutritional quality and predispose soldiers to NCDs.

Furthermore, the UN mission related deployment stress, sleep disturbances, long-term separation from families, irregular schedules and challenging environmental conditions compromised individual's physical, mental and social health (Di Razza et al., 2020; Yuan et al., 2024). Similarly, during mandatory physical training, excessive strenuous exercises can precipitate underlying health conditions whereas during non-training time, soldier may follow sedentary life particularly those in administrative roles, both of which increases risk of NCD. Beyond that, soldiers are also exposed to occupational hazards like post-traumatic stress disorder and adjustment disorder, which increases NCDs. In addition, Nepal's diverse topography mountainous region exceeding 4000 meters on one end and flat terrain with hot and humid climate at another may play as risk factor to NCDs. In high altitude, low temperature and chronic oxygen deprivation affect cardiovascular function, red blood cell production and intermediary metabolism

which potentially unmask underlying disease conditions. Moreover, military chain of command may restrain personnel from reporting health concerns, and have reluctance on seeking medical care fearing possible impact on career progression (Shrestha et al., 2019).

Discussion

The evidence revealed that NCDs represent an escalating yet inadequately addressed health crisis within Nepali Army. Soldiers are facing dual vulnerability from risk factors and occupation specific risk factors. Successful NCD management in the Nepali Army will require multi-level strategies that integrate individual behavior change programs with systemic reforms including enhanced screening protocols, nutrition improvements in military facilities, mental health support to address stress-related metabolic disorders, and career policies that accommodate chronic disease management without penalizing affected soldiers.

Impact of NCDs on Military Effectiveness

NCDs significantly compromise military operational readiness, increase economic costs and effect social and economic well-being of any nation. There is risk to soldiers with uncontrolled hypertension, uncontrolled diabetes, or other NCDs while they are deployed to peacekeeping missions, in high-altitude, or austere environments lacking medical facilities. During deployment, unidentified or inadequately controlled NCDs might present as emergency conditions (myocardial infarction, stroke, diabetic ketoacidosis) needing urgent medical evacuation. Soldiers with obesity or low aerobic fitness have been shown to be at increased risk for heat stroke, musculoskeletal injuries and failure to meet training requirements (Bedno et al., 2014). Such NCD related risk factors influence combat readiness, emergency responses as well as fulfillment of daily obligations of soldiers.

Thus, soldiers with unmanaged, undiagnosed silently creeping NCDs have profound effects on physical performance, mental health of the soldiers, and financial burden to the organization with premature medical discharge from the duty. The economic burden of NCDs on the Nepali Army encompasses multiple cost categories. Direct medical costs include treatment of hypertension, diabetes, and cardiovascular disease with continuing medication, laboratory monitoring, specialist consultations, and potential hospitalizations. As the Nepali Army operates its own medical system (Shree Birendra Hospital, Command hospitals, Field Hospitals and other affiliated health facilities), these costs are borne directly by the military medical budget. Despite increased life expectancy, NCDs cause higher morbidity that reduces social productivity and creates substantial

financial burdens through pension obligations and medical insurance costs that accumulate over decades. Soldiers with NCDs experience more sick leave, reduced work capacity, and limitations on duty assignments. Hence, the investment on soldiers during recruitment, training, and experience gain is lost when soldiers retire prematurely.

NCDs have an impact on social welfare and workforce development in addition to economic factors. Soldiers, who have poorly managed or misdiagnosed or underdiagnosed NCDs, run the risk of dying young. Physical limitations, adverse drug reactions, consequences of illnesses like amputation, blindness, kidney failure, and psychological effects are a chronic disease that ultimately reduces the quality of life. The consequences of which, is ultimately suffered by the families of the victims leading to emotional distress and financial burden. Retired soldiers may experience worsening NCD issues and limited access to civilian healthcare, especially in rural regions, in the absence of regular health monitoring and support.

Prevention Strategies

The prevention of NCDs includes primary, secondary and tertiary level of prevention.

Primary Prevention

Prevention of NCDs like cardiovascular diseases needs measures targeting the modifiable risk factors which include tobacco elimination with empowering tobacco free behavior. Removing tobacco products from markets and creating smoke-free areas along with awareness program on tobacco hazards and motivating consumers to quit tobacco via campaigning. Similar strategies can be applied to reduce or stop alcohol consumption too. Similarly, measures like low salt diet, low sugar, low or no consumption of saturated fats can reduce NCDs. Physical training avoiding overtraining injuries, and incorporating cardiovascular fitness with VO_2 max (V = volume; O_2 oxygen, how much oxygen one's body consumes while exercising) testing has been proven effective (Franklin et al., 2022; Weatherwax et al., 2024). Occupational stress must be acknowledged as inherent hazards which requires accessible mental health services, mental resilience training, adequate recovery periods between postings, peer support networks, and deliberate efforts to reduce stigma surrounding help-seeking to prevent NCDs in soldiers.

Secondary Prevention

Reduction in morbidity and prevention of NCDs related mortality can be achieved with early identification of NCDs like cardiovascular diseases (hypertension, stroke),

diabetes, cancer, chronic kidney diseases, arthritis, and mental health disorders. Identification can be performed by periodic examination and/or regular screening programs that incorporate blood pressure measurements, fasting glucose and lipid panels, calculating body mass index, doing mammograms, pap-smear examination, etc. Once identified, NCDs can be managed with better prognosis and reduced complications. For soldiers, pre-deployment screening protocols, as per UN peacekeeping standards, must be followed strictly. Age-specific screening should be intensified for soldiers. Similarly, empowering soldiers through life style modifications and self-monitoring programs like measurement of blood pressure with digital sphygmomanometer and glucose monitoring with glucometer, engages soldiers for individual health engagement that helps in early symptom reporting. Soldiers must be informed that provision of re-categorization with periodic health check-up and compliance with treatment will upgrade the ones medical category and allay the fear of losing the best opportunities in their career.

Tertiary Prevention

To prevent further progression and complication of NCDs, demands comprehensive management. Use of medicine for long-term and providing support services to help patients regain their normal function help minimize complications, prevent disability and improve overall quality of life. This is not limited to advanced medical treatments but also includes institutional level support to help patients adapt and recover after diagnosis. Tertiary prevention incorporates rehabilitation, socioeconomic support and continuous monitoring. Access to telemedicine should be strategically leveraged to provide specialist consultations for soldiers stationed in remote locations, maintain care continuity throughout deployments, and enable medical management under field conditions where traditional healthcare access is limited.

Resolving Non-Communicable Diseases

Based on the evidence reviewed and international best practices, the following recommendations are proposed for resolving NCDs in the Nepali Army:

- Conduct comprehensive NCD prevalence survey across Nepali Army units
- Conduct research on risk factors of NCDs specific to military services, high-altitude service, EHRI and deployment patterns.
- Implement annual NCD screening for all soldiers with standardized documentation, preferably digitalization with database.
- Establish NCDs clinics and awareness classes at military hospitals.

- Review and revise uniform and equipment policies to prevent heat-related illness and unnecessary health risks during training.
- Launch tobacco cessation programs at all military facilities along with ban in sale and consumption of tobacco in army units.
- Launch alcohol cessation programs at all military facilities along with ban in sale and consumption of alcohol in army units.
- Nutritional status needs modification with reduced salt, sugar, and unhealthy fats; increased fruits and vegetable consumption.
- Establish fitness standards according to body composition, geographical terrain and existing health condition.
- Implement electronic health record system tracking individual NCD risk factors and outcomes longitudinally.
- Conducting periodic stress management session, optimizing sleep- and work-life balance.
- Revising and reviewing medical category system.
- Strengthening district hospitals with experts, equipment and infrastructures to deal with the rising complications and emergencies due to NCDs.

Challenges in NCD Prevention

Implementing comprehensive program on NCD prevention may incur substantial initial costs for screening, infrastructure, electronic health records and telemedicine systems. Moreover, military hierarchical culture may resist lifestyle interventions, particularly tobacco and alcohol cessation programs. Additionally, medical categorization could discourage soldiers from reporting symptoms, fearing career progression impacts and perceived weakness within the military culture.

Conclusion

NCDs are a growing threat to the soldiers of the Nepali Army. The unique occupational demands, environmental exposures, and lifestyle factors characterizing military service create distinctive risk profiles requiring tailored interventions. Recent studies among Nepali Army personnel revealed concerning patterns: significant proportions of soldiers harbor undiagnosed hypertension, metabolic risk factors are prevalent, and the youngest military age groups are affected during their peak productive years. Fortunately, the majority of NCD risk factors are modifiable.

Evidence-based interventions addressing tobacco use, nutrition, physical activity, alcohol consumption, and stress can substantially reduce disease burden. The Nepali

Army has demonstrated capability in complex operations from Himalayan Mountain warfare to international peacekeeping; that same organizational excellence must now be directed toward the hidden threat of NCDs. By confronting NCDs proactively, the Nepali Army can protect its most valuable asset-its soldiers-while maintaining operational readiness, reducing healthcare costs, and fulfilling its commitment to personnel well-being.

The battle against NCDs may not be fought with conventional weapons, but winning this battle is essential to winning all others. However, the current evidence base for NCDs in Nepali Army relies primarily on small sample cross-sectional studies from selected barracks, limiting the generalizability across entire force and preventing assessment of temporal trends. Comparative lessons from other militaries might offer valuable insights. Future research should include comprehensive longitudinal study across Nepali Army units and adapt the interventions that account for Nepal's specific geographical, cultural and resource contexts.

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