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EPIDEMIOLOGICAL TRENDS, OBESITY, AND METABOLIC RISKS AFFECTING MILITARY READINESS AND TRAINING SYSTEMS – AN INTERNATIONAL PERSPECTIVE

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ABSTRACT: *Obesity and metabolic risk factors represent a growing challenge to military readiness worldwide, imposing a substantial burden on personnel health, training capacity, and operational capability. This study examines epidemiological data from France, Germany, Poland, the United Kingdom and global meta-analyses, highlighting prevalence rates of overweight and obesity, as well as cardiovascular and metabolic syndrome risks in military populations. Findings reveal that between 45.7 and 67.7% of servicemembers are overweight or obese, with 21–44% showing moderate to high cardiometabolic risk, often influenced by rank, unit type, and lifestyle factors. These conditions reduce fitness, increase injury and illness rates, and may accelerate attrition. The analysis underlines the urgent need for targeted prevention, structured lifestyle interventions, and integrated health monitoring to maintain a deployable force and to support training personnel.*

KEYWORDS: *military health, obesity, metabolic risk, readiness, training challenges*

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INTRODUCTION

Background and Problem Statement

Obesity and metabolic risk factors – such as hypertension, dyslipidaemia, insulin resistance, and metabolic syndrome – represent one of the most severe public health challenges of our time. According to the World Health Organization (WHO), more than one billion people worldwide were obese in 2022, and the prevalence is rising sharply in both developed and developing countries. Overweight and obesity not only increase the risk of chronic diseases, such as type 2 diabetes, cardiovascular disease, and musculoskeletal disorders, but also reduce productivity and quality of life among the working-age population.

For military organisations, the problem is of particular concern since physical fitness is one of the most essential prerequisites for operational readiness. General John M. Shalikashvili,[1] former Chairman of the U.S. Joint Chiefs of Staff, described obesity as a new national security threat in an interview with *The Washington Post*.[2] Declining physical performance, an increased susceptibility to injuries, and higher rates of sick leave associated with obesity and the metabolic syndrome directly undermine the operational capabilities of armed forces. In the United States, obesity imposes a particularly heavy burden on the military health system: obesity-related conditions are estimated to account for USD 1.1 billion in annual costs and approximately 658,000 lost duty days per year.[3] While the U.S. situation is well documented, similar trends are being increasingly reported in European armed forces as well.

Military Specificities

The health status of military personnel differs in several respects from that of the civilian population. Soldiers generally represent a younger and physically fitter cohort; however, military service itself exposes them to unique risk factors. Psychological stress, irregular sleep, lifestyle changes associated with overseas deployments, and dietary habits frequently exacerbate the risk of metabolic disorders. Military training and operational duties demand regular high-intensity physical exertion, which overweight and metabolically compromised soldiers can only meet to a limited extent. This creates additional challenges for training personnel, who are compelled to design differentiated, individualised training programmes to ensure that the minimum fitness standard required for deployability is met by all servicemembers.

Research Objectives

The aim of this study is to provide an overview, based on international literature, of the prevalence of obesity, overweight, and metabolic risk factors in military populations, with a particular focus on their impact on operational readiness and the effectiveness of training. The analysis draws on data from the United States, France, Germany, Poland, the United Kingdom, as well as global meta-analyses, since these forces have recently conducted large-scale epidemiological surveys. By comparing these data, the study seeks to identify common patterns and national specificities and to formulate recommendations for prevention and health promotion in the military context.

Methodological Approach

This study is based on a combined qualitative and quantitative literature review, analysing peer-reviewed publications indexed in scientific databases such as PubMed, Scopus, and Web of Science between 2018 and 2024. Special emphasis was placed on epidemiological investigations, as well as reports issued by NATO and national defence organisations. The analysis compares the prevalence of overweight, obesity, and metabolic syndrome and interprets the

[1] John M. Shalikashvili (June 27, 1936–July 23, 2011) was a United States Army general who served as Chairman of the Joint Chiefs of Staff from October 1993 to September 1997.

[2] Shalikashvili 2010.

[3] Dall 2007.

findings in terms of readiness and training dimensions. Finally, both short-term and long-term intervention strategies are proposed.

INTERNATIONAL EPIDEMIOLOGICAL OVERVIEW

United States

According to the U.S. Department of Defense, obesity is among the leading causes of disqualification from military service, accounting for more than 650,000 lost duty days annually and imposing considerable additional costs.[4] Data recently released by the U.S. Air Force show a dramatic rise in obesity rates during the COVID-19 pandemic: from approximately 18% prior to the pandemic to 26.9% in its later stages – a relative increase of 44.1%. Similar upward trends have been observed across the Navy, Army, and Marine Corps.[5]

The implications of obesity and metabolic risk factors for military readiness are multifaceted.

With respect to recruitment, fitness for duty, and retention, obesity constitutes a critical barrier: obese individuals demonstrate lower readiness levels and are more frequently discharged prematurely. In the U.S. National Guard and Reserve components, weight gain and obesity particularly undermine recruitment, retention, and deployability, with weight-related medical conditions frequently leading to exclusion or termination of service.[6]

France

The health status of French Armed Forces personnel has been examined in several large-scale surveys in recent years. A study published in 2024, encompassing more than 17,000 servicemembers, reported that 36.1% were overweight and 9.6% obese according to WHO Body Mass Index (BMI) criteria.[7] Overweight and obesity were more prevalent among non-commissioned officers and members of the Gendarmerie, while officers demonstrated somewhat lower prevalence rates. Male soldiers showed significantly higher mean BMI values than females. Notably, obesity risk was lower among soldiers than in the civilian population, and the socio-economic background appeared to play a lesser role.

An earlier study (2016–2017), based on 1,589 participants, yielded similar findings: 38.7% overweight and 10% obese.[8] The study demonstrated that the prevalence of obesity increases with age and is associated with higher rank and longer service duration. While French soldiers overall present a lower cardiometabolic risk profile than civilians, the data clearly indicate concerning trends from the perspective of operational readiness.

4 American Security Project 2025.
5 Merfeld et al. 2025.
6 American Security Project 2025.
7 Mannaioni et al. 2024.
8 Quertier et al. 2022.

Germany

Epidemiological analyses of the Bundeswehr also reveal significant risks. A large-scale study published in 2024, involving 43,214 servicemembers, found that 18% were obese. When BMI was combined with waist circumference, 44.4% of personnel were classified as having moderate to high cardiometabolic risk.[9] Male soldiers and officers exhibited higher rates of obesity, whereas combat unit personnel displayed more favourable outcomes compared with those in non-combat assignments.

Another study in 2023 highlighted that service duration correlates with BMI increase: the longer a soldier remains in service, the greater the likelihood of becoming overweight or obese.[10] This trend is particularly concerning given that experienced personnel play a critical role in training and leadership.

Poland

A survey conducted between 2018 and 2020 with 1,229 Polish soldiers revealed that 33% had normal weight, 49.7% were overweight, and 17.3% were obese.[11] The prevalence of metabolic syndrome was reported in 8.5%. The study found that obesity was closely associated with irregular sleep, stress-induced overeating, low levels of physical activity, and excessive screen time.

These findings indicate that in addition to physical demands, the psychosocial environment of military service also represents a significant risk factor. Polish researchers emphasised that metabolic risk prevalence was higher among soldiers with longer service duration, corroborating the German findings regarding the cumulative impact of years in service.

United Kingdom

In the UK Armed Forces, overweight and obesity represent major health challenges. Available epidemiological data indicate that approximately 56% of personnel are overweight (BMI 25–29.9) and 12% are obese (BMI ≥30). Taken together, nearly two-thirds (68%) of British servicemembers are at increased cardiometabolic risk based on BMI.[12]

The situation is particularly concerning among older age groups and personnel in supporting or logistics roles, where physical demands are lower. In contrast, high BMI poses training challenges among new recruits, with reports from recruitment centres highlighting that a proportion of enlistees require remedial physical training or drop out of programmes prematurely.[13]

This structural problem necessitates targeted interventions, as UK military readiness, similar to that of the United States, is strongly associated with BMI, physical performance, and metabolic risk factors. To address this issue, the Ministry of Defence has initiated several programmes and prevention strategies, including the DOfit pilot project aimed at weight management and lifestyle improvement.

[9] Scheit et al. 2024.
[10] Scheit et al. 2023.
[11] Gaździńska et al. 2022.
[12] Sanderson et al. 2018.
[13] Lewis 2019.

Global Meta-Analyses

A 2020 systematic review and meta-analysis of multiple military populations worldwide reported that the average prevalence of metabolic syndrome was 21%, with 35% overweight and 14% obese. The most common associated risk factors were elevated LDL cholesterol (32%), hypertension (26%), and insulin resistance.[14]

Other studies have estimated the prevalence of metabolic syndrome in military populations at 8–8.3%, with differences largely attributable to varying diagnostic criteria.[15] Nevertheless, global evidence clearly demonstrates that metabolic risks affect military personnel universally, irrespective of national specificities. The prevalence of overweight, obesity, and metabolic syndrome in the armed forces of the studied nations is summarised in Table 1.

Table 1 *Obesity, overweight, and metabolic syndrome prevalence rates among military personnel of some NATO member states (edited by Attila Novák, PhD)*

Country/ Region	Sample size	Overweight (%)	Obesity (%)	Metabolic Syndrome (%)	Source
USA	> 150,000	32–34	14–17	20–25	Pierce et al. 2019; ASP 2025
France	17,082	36.1	9.6	n.a.	Mannaioni et al. 2024
Germany	43,214	~26	18.0	44.4 (moderate/ high risk)	Scheit et al. 2024
Poland	1,229	49.7	17.3	8.5	Gaździńska et al. 2022
UK	~10,000	55.7	12.0	n.a.	Sanderson et al. 2018; Lewis 2019
Global meta-analysis	multi	35	14	21	Baygi et al. 2020
(n.a. = no available data)					

ANALYSIS: IMPLICATIONS FOR READINESS AND TRAINING

Physical Performance and Endurance

High levels of physical performance are among the fundamental requirements of military service. Obesity, however, significantly reduces endurance, muscular strength, and reaction speed. Excess body fat imposes mechanical strain on the joints, increases the incidence of orthopaedic injuries (e.g., knee and hip problems), and exacerbates the risk of heat stress

[14] Baygi et al. 2020.
[15] Rostami 2019.

and dehydration. Studies in the German Bundeswehr indicate that soldiers with moderate to high cardiometabolic risk perform significantly worse on physical fitness tests compared with peers of normal BMI.[16] Data from France and Poland further suggest that overweight and obesity are linked to higher dropout rates already during the initial phases of training. These trends not only jeopardise individual careers but also reduce training effectiveness and place considerable strain on training staff resources.

Injuries and Health Risks

Obese soldiers are at greater risk of injuries, particularly musculoskeletal and orthopaedic problems. U.S. studies indicate that obese recruits are 15–20% more likely to sustain injuries during basic training, resulting in lost duty time and, in many cases, premature discharge.[17]

Beyond mechanical issues, obesity is closely associated with cardiovascular disease and type 2 diabetes. Soldiers diagnosed with metabolic syndrome exhibit markedly higher prevalence of hypertension, lipid abnormalities, and insulin resistance compared with their normal-weight counterparts.[18] These conditions not only increase the burden on military healthcare systems but also reduce the proportion of deployable personnel.

Fitness for Duty and Attrition

Obesity and metabolic disorders are increasingly recognised as decisive determinants of military fitness for duty. In the United States, obesity is one of the leading causes of medical disqualification from service, contributing to thousands of premature discharges annually.[19] German and Polish findings similarly demonstrate that personnel with higher BMI are more frequently subject to temporary or permanent exemption from duty.[20]

The challenge is particularly acute in the reserve forces, where sedentary civilian lifestyles, stress, and unfavourable dietary patterns contribute to a higher prevalence of overweight and obesity. This undermines the rapid mobilisation and deployability of reserve units.[21]

Recruitment and Accession Challenges

Obesity also poses significant challenges at the recruitment stage. In several NATO countries – including the United States and the United Kingdom – 15–20% of applicants are automatically disqualified from military service due to excessive body weight. This problem has become even more pronounced in the aftermath of the COVID-19 pandemic.[22] While comparably detailed national data are lacking for Hungary and some European forces, the trend is clear: rising obesity in civilian populations directly threatens both the quality and quantity of military recruitment. According to the 2018 U.S. Department of Defense Health

16 Scheit et al. 2024; Scheit et al. 2023.
17 American Security Project 2025.
18 Pierce et al. 2019.
19 Sanderson et al. 2018.
20 Scheit et al. 2024; Scheit et al. 2023; Gaździńska et al. 2022.
21 American Security Project 2025.
22 Wuerdeman et al. 2023.

Related Behaviors Survey (HRBS),[23] among active component servicemembers, 52% were overweight and 16% obese.[24] Clinical data suggest that the prevalence of obesity increased further by 2020.

Training Burden on Instructors

The presence of overweight and obese personnel places additional burdens on training instructors. Standardised training programmes often need to be modified or individualised based on varying levels of physical capability. This not only decreases training efficiency but also increases workload and the risk of burnout among instructors.

Experiences from the German Bundeswehr and the Polish Armed Forces reveal that instructors are often compelled to implement remedial training programmes for soldiers at metabolic risk. While beneficial, these programmes are resource-intensive and time-consuming, further straining already limited training capacities.

Summary

The analysis clearly demonstrates that obesity and metabolic syndrome represent not only health concerns but also major readiness and human resource management challenges. Declining physical performance, greater susceptibility to injuries and illnesses, reduced fitness for duty, recruitment difficulties, and increased training burdens collectively exacerbate the operational risks facing military organisations.

Addressing these issues requires a comprehensive, multi-level approach grounded in prevention, regular monitoring, and targeted interventions.

PREVENTION AND INTERVENTION RECOMMENDATIONS

Lifestyle Interventions and Health Promotion

Among military personnel, the most effective prevention strategies are complex lifestyle interventions that simultaneously target nutrition, physical activity, and sleep quality. The U.S. Army's Performance Triad programme – built on the "Sleep, Activity, Nutrition" triad – has demonstrated that programmes combining education, individualised training plans, and nutritional counselling can reduce BMI and improve cardiometabolic outcomes. Soldiers participating in the programme achieved an average 5–7% reduction in body weight and significant improvements in VO_2 max within 12 months.[25]

In Europe, the German Bundeswehr introduced the Fit im Dienst initiative with similar objectives, offering structured training sessions, dietetic consultations, and lifestyle assess-

[23] The DoD HRBS is an abbreviation for the Department of Defense Health Related Behaviors Survey, a large-sample, representative survey commissioned by the US Department of Defense (DoD). DoD HRBS is conducted among active-duty military personnel approximately every 3–4 years (since the 1980s), and examines health status, dietary habits, physical activity, smoking, alcohol, drug use, mental health (e.g., depression, PTSD), and rates of overweight and obesity.

[24] Meadows et al. 2021; Knapik et al. 2023.

[25] U.S. Army Public Health Center 2020.

ments.[26] Evaluations revealed significant reductions in waist circumference and improved endurance performance among participants.[27]

Targeted Prevention Programmes

Evidence suggests that generalised health promotion programmes for the entire force are less effective than interventions focusing on high-risk groups. In France, a 12-week combined dietary and physical training programme implemented within the Gendarmerie yielded measurable BMI reduction and improved lipid profiles in 72% of participants.[28] In Poland, a pilot "Combat Ready" protocol incorporating functional training and high-intensity interval training (HIIT) significantly improved explosive strength, endurance, and body composition within a short period.[29]

These findings underscore that dedicated, individualised programmes for overweight and metabolically at-risk soldiers are more effective than standardised, one-size-fits-all approaches.

Health Monitoring and Screening

Routine health examinations are mandatory in military service, but current practice often emphasises general physical fitness over detailed monitoring of metabolic risks. Some national health protocols require regular health and fitness assessments that include BMI, blood pressure, and laboratory markers. Typically, these assessments are conducted annually or according to occupational role and age group, but there is no universal NATO-level requirement for biennial metabolic screening. In the United States, the annual Periodic Health Assessment (PHA) ensures regular monitoring, including BMI, blood pressure, and, where indicated, laboratory parameters such as lipid profile and blood glucose.[30] Similarly, the United Kingdom's JSP 950 Medical Policy mandates in-service medical assessments that include BMI and blood pressure measurements.[31]

The integration of modern technologies – such as wearable fitness monitors, sleep trackers, and digital health logs – enables continuous, real-time monitoring of soldiers' health. This allows for long-term tracking of individual performance and timely interventions when necessary.

Integration of Mental Health

Psychological stress, trauma, and sleep deprivation directly contribute to the development of metabolic disorders in military populations. Mental and physical health risks are mutually reinforcing. Data from the Millennium Cohort Study show that post-traumatic stress disorder (PTSD) is strongly associated with physical inactivity, overweight, and obesity. LeardMann et al. in a cohort of over 76,000 U.S. servicemembers, demonstrated that PTSD

[26] Bundeswehr 2015.
[27] Scheit et al. 2024; Scheit et al. 2023; Meadows et al. 2021.
[28] Mannaioni et al. 2024; Quertier et al. 2022.
[29] Gaździńska et al. 2022; Gaździńska et al. 2023.
[30] U.S. Department of Defense 2025; U.S. Army Human Resources Command 2024.
[31] UK Ministry of Defence 2022.

significantly increases the risk of obesity and metabolic disease while reducing physical activity levels. This highlights how impaired psychological well-being directly undermines operational readiness, with mental disorders often manifesting as metabolic syndrome, thereby reducing training efficiency and deployability.

Preventive programmes are most effective when psychological support is integrated alongside physical interventions.[32] Combined programmes – including stress-management techniques (e.g., breathing exercises, mindfulness training) and sleep hygiene education – offer more sustainable outcomes than those focusing exclusively on physical training or diet. Stress-management and sleep modules should therefore be incorporated into all training cycles, particularly for personnel preparing for deployment, where psychological and physical stressors are especially pronounced.[33]

Technological and Digital Solutions

Digital health monitoring and AI-based data analysis provide new opportunities for prevention. Wearable devices generate individual-level data that enable instructors to monitor soldiers' fitness, recovery, and metabolic risk in real time. Such tools facilitate the personalisation of training plans, early detection of overtraining, and prevention of injuries and chronic conditions. The key to effective prevention and intervention lies in a targeted, integrated, and data-driven approach. Alongside general health promotion, high-risk groups require focused attention, regular metabolic screening, and mental health support. International experience confirms that combined lifestyle interventions can sustainably improve health and readiness of military personnel.

RECOMMENDATIONS AND FUTURE RESEARCH DIRECTIONS

Short-Term Measures

Based on current epidemiological evidence, it is obvious that obesity and metabolic risk factors directly threaten military readiness. In the short term, such interventions should be introduced that specifically target the most vulnerable groups.

Risk-Based Intervention Programmes

Annual health assessments should be supplemented with screenings that identify high-risk individuals based on cardiometabolic indicators, such as BMI, waist circumference, lipid profile, blood pressure, and blood glucose. Identified personnel should be enrolled in 3–6-month personalised lifestyle programmes that integrate nutrition counselling, structured exercise, and psychological support.

Functional Training and HIIT Integration

In addition to traditional endurance and strength training, functional exercises and HIIT have proven more effective in improving body composition and reducing the risk of meta-

[32] LeardMann et al. 2011.

[33] U.S. Department of Defense 2025.

bolic syndrome. Numerous meta-analyses and clinical studies confirm that HIIT produces superior outcomes compared with continuous aerobic training, particularly in reducing blood glucose, blood pressure, and waist circumference, as well as improving insulin sensitivity and VO_2 max.[34] Incorporating these methods into basic training can yield measurable improvements in the short term.[35]

Long-Term Strategic Developments

The challenges of obesity and metabolic risk cannot be solved by short-term interventions alone. Comprehensive prevention and health promotion systems must become integral components of long-term military health policy.

Integrated Military Health Database

Data on physical performance, metabolic status, and mental health should be collected in a centralised digital health database. This would enable long-term monitoring of trends, facilitate individual progress assessment, and support evidence-based command decision-making.

Unit-Level Health Profiles

Each military unit should prepare an annual health report summarising the body composition, fitness, and metabolic risk profile of its personnel. Such tools would help commanders set training priorities and allocate resources effectively.

Strengthening the Reserve Component

Promoting health within the reserve forces is of strategic importance as their deployability is critical during mobilisation. Special programmes adapted to civilian lifestyles should be designed for reservists, focusing on balanced nutrition, physical activity, and stress management.

Future Research Priorities

1. Military-Specific Criteria for Metabolic Syndrome:
   Current civilian diagnostic criteria (e.g., WHO, IDF definitions) do not always accurately reflect the specific characteristics of military populations, particularly in personnel with high muscle mass. There is a need to develop military-specific criteria that account for the demands and lifestyle of servicemembers.

2. Longitudinal Cohort Studies:
   Most available data are cross-sectional. Prospective, multi-year cohort studies are needed to assess the long-term impact of obesity and metabolic syndrome on military careers, susceptibility to injuries, and attrition rates.

[34] Poon et al. 2024; Serrablo-Torrejón et al. 2020; Al-Mhanna et al. 2025.
[35] UK Ministry of Defence 2022.

3. Evaluation of Digital and Technological Interventions:
   The integration of wearable devices, biosensors, and digital training platforms represents a promising avenue. Rigorous scientific studies are needed to establish how effective these tools are in improving servicemembers' health and mitigating metabolic risks.

SUMMARY

The recommendations and research priorities presented here underline that addressing obesity and metabolic syndrome in military populations requires a systemic, multi-level approach. While short-term measures must focus on targeted interventions, long-term strategies should involve integrated health data systems, unit-level programmes, and multinational research collaborations. Only through such comprehensive approaches can armed forces maintain readiness, resilience, and operational capacity in the face of rising metabolic health challenges.

CONCLUSION

The findings of this study clearly demonstrate that obesity and metabolic syndrome are not only public health concerns but also significant **readiness and human resource management challenges** for modern armed forces. Declining physical performance, higher incidence of injuries and chronic diseases, reduced fitness for duty, difficulties in recruitment and retention, as well as increased burdens on training personnel collectively amplify operational risks.

Addressing these challenges requires a **comprehensive, multi-level strategy** that combines prevention, continuous monitoring, and targeted intervention. Evidence from international practice highlights the effectiveness of integrated lifestyle interventions, combining physical training, nutritional counselling, stress management, and sleep hygiene, in sustainably improving health and readiness of servicemembers.

In the short term, focused interventions are needed for high-risk groups. Meanwhile, in the long term, systemic solutions must be implemented, including integrated digital health databases, unit-level health profiling, and multinational research collaborations. Only through such approaches can armed forces effectively mitigate the growing impact of obesity and metabolic risk factors, thereby safeguarding their operational readiness and resilience.

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