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#Contents

# Foreword	04
#01 Antigua Correlates of Postpartum Relapse to Smoking among Women Who Quit Combustible and Electronic Nicotine Products During Pregnancy using Pregnancy Risk Assessment Monitoring System Phase 8 (2016–2022) Data	08
#02 Bolivia Health System Adaptation to Climate Change in a Globalized Food Chain: A Comparative Study of Quinoa Producers in the Bolivian Andes and Quinoa Consumers in Germany	10
#03 Brazil Critical analysis of torture and cruel treatments and their implication for prison health in Brazil	16
#04 Georgia Public Awareness on Health Risk Perception of Outdoor Air Pollution in Tbilisi: An Exploratory Study	20
#05 Honduras Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies	26
#06 Indonesia Innovative Digital-Driven Interventions to Enhance Glove Compliance Among Pest Control Technicians: A Quasi-Experimental Study in Samarinda, East Kalimantan, Indonesia	42
#07 Malaysia Enhancing Emergency Care in Resource-Limited Settings in Sabah, Malaysia	48
#08 Pakistan Perceived Causes and Effects of Overcrowding among Emergency Healthcare workers in Azad Jammu and Kashmir	50
#09 South Africa Climate change and primary health care in Africa: a scoping review	54
#10 South Africa Promoting Inclusive African Indigenous Knowledge Systems-Based Disaster Trauma Risk Reduction Management for Sustainable Futures	56
#11 South Africa African Youth Digitalizing Traditional Healthcare Systems for global Epistemic Justice: Prospects and Challenges in Southern Africa	64
#12 Ukraine Modern Aspects of Trauma Causes and Prevention Strategies	70
#13 Ukraine Effect of the War in Ukraine on the Mental Health of Medical Students and the Anxiety Levels of Children	82
#14 Ukraine The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime	86
#15 Ukraine War's carbon footprint and the combined climate-health crisis in Ukraine	98
#16 Yemen Factors Related to Knowledge, Attitudes, and Behaviors Regarding Cervical Cancer Among Yemeni Women	104

#Foreword

Global health is gaining renewed urgency in an era marked by overlapping crises. The term “global” should not be understood solely in geographical terms. It also describes the comprehensive, interconnected and deeply social nature of health. In this sense, political decisions, economic conditions, climate change, social cohesion, migration, conflict, digital transformation and individual attitudes all shape the determinants of health and disease. Conflicts and climate-related extreme occurrences provide an acute threat to human health, while long-term, equally disruptive environmental, social, and structural changes pose a chronic threat.

Simultaneously, health too often risks losing visibility in public decision-making. 2028 will mark the 50th anniversary of the Alma-Ata Declaration, which affirmed health as a fundamental human right and called for universal basic health care. Since, health coverage for all, health equity and sustainable development have emerged as key objectives in international frameworks, including the WHO’s 2010 Universal Health Coverage agenda as well as the 17 United Nations Sustainable Development Goals. Yet progress remains fragile. The COVID-19 pandemic, ongoing humanitarian crises, widening social inequalities and inadequate climate change action have shown how quickly public health achievements can be challenged or reversed.

Therefore, it is essential to create spaces in which young researchers can meet, present their work, question established approaches and develop new ideas for more equitable, resilient, and sustainable health systems. This 8th volume of the Akkon Schriftenreihe embodies this motivation and builds on the precedence set in past editions.

Mirroring these ideals, the International Young Researchers’ Symposium on Global Health, organized in the lead-up to the World Health Summit by the Akkon University of Human Sciences and its Institute for Research in International Assistance (IRIA), brings students, early-career researchers and professionals from various countries, disciplines, and partner institutions together.

This year’s volume continues to document the perspectives, commitment, and scientific curiosity of IRIA’s network of young researchers; showcasing a form of global health research that is both academically rigorous and oriented toward practical impact. The contributions demonstrate that the next generation is not only an audience for global health debates, but also an active force in shaping

them. Inviting us to listen closely, collaborate across boundaries and offer them our support – young researchers are actively developing the ideas and partnerships that global health urgently needs.

Our big thanks goes to all contributors, their supervisors, their respective institutions and also sponsors for their wonderful support and collaboration.

Enjoy reading!

Prof. Dr. med. Dr. PH Timo Ulrichs & Gaby Feldmann
Head of Institute for Research in International Assistance (IRIA) /
Akkon University of Human Sciences

#Foreword

From Crisis to Resilience: Innovating for Health Next Generation Perspectives on Global Health

Dear friends, colleagues and partners of IRIA and the Akkon University,

Global Health is facing profound and interconnected challenges. Conflict, climate change, social inequalities, economic uncertainty, and rapid technological transformation are increasingly inflicting health and health systems around the world. These challenges can only be addressed if borders and divisions are overcome and collaboration across nations, disciplines, sectors, and generations is established. To achieve this, spaces for dialogue, scientific exchange, and the co-development of new ideas are more important than ever.

The World Health Summit serves as such a platform, bringing together stakeholders from academia, politics, civil society, and the private sector to foster collaborative solutions for key global health priorities. Scientific evidence, international cooperation, and the translation of knowledge into action remain at the center of these efforts.

Innovation is essential in this context. Innovation for health goes far beyond technological progress or new medical breakthroughs. It includes new approaches to governance, financing, education, partnerships, service delivery, and societal participation. Ultimately, the goal is to strengthen resilience: the ability of health systems and societies to anticipate, adapt to, and respond effectively to crises and long-term change.

Sustainable health will depend on the ideas, commitment, and leadership of the next generation. Engaging young professionals, early-career academics, and students is therefore an important part of the World Health Summit's broader mission to foster inclusive dialogue and connect diverse perspectives across global health. Their questions, research, and practical approaches help challenge established assumptions and contribute to more equitable, sustainable, and future-ready health systems worldwide.

This publication brings together projects and contributions from students working in the field of Global Health. It demonstrates the diversity of perspectives, academic commitment, and sense of responsibility with which emerging professionals

and academics are engaging with today's most pressing health challenges. The contributions reflect both the complexity of global health and the importance of interdisciplinary collaboration in developing meaningful solutions.

I would like to thank everyone involved for their dedication and contribution to this publication. I hope it offers readers valuable insights and inspiration for continued dialogue and action in global health.

Prof. Dr. Axel R. Pries
President, World Health Summit



#01 Antigua

Correlates of Postpartum Relapse to Smoking among Women Who Quit Combustible and Electronic Nicotine Products During Pregnancy using Pregnancy Risk Assessment Monitoring System Phase 8 (2016–2022) Data

Srusti Shenoy, Devyani Dogra, Rathika Shenoy, Leslie Walwyn, Juan Acuna

BACKGROUND. Postpartum relapse to smoking carries serious health risks for both mothers and their infants, and impedes future tobacco cessation efforts. Although women may quit using combustible and electronic nicotine products during pregnancy, various socio-demographic factors influence their relapse into nicotine use postpartum.

OBJECTIVE. To examine the prevalence and assess the socio-demographic correlates of postpartum smoking in women who quit combustible and electronic nicotine products during pregnancy, using Pregnancy Risk Assessment Monitoring System (2016–2022) data.

METHODS. We analyzed data from 22,132 women (weighted count: 1,106,578) who quit combustible and electronic nicotine product use during pregnancy to estimate the weighted prevalence of postpartum smoking relapse. We also assessed significant sociodemographic correlates using multiple logistic regression. Associations were expressed as adjusted odds ratios with 95% confidence intervals [AOR (95%CI)].

RESULTS. During the postpartum period, 32.1% of women resumed smoking after abstinence during pregnancy. Correlates of postpartum smoking relapse included maternal age <20 [AOR: 1.5 (95%CI: 1.2, 1.9)], Black race [1.5 (1.3, 1.8)], and multiparity [1.5 (1.3, 1.7)]. Postpartum smoking was less likely among graduates [0.8 (0.7, 0.9)]. Women who quit electronic nicotine products were less likely to smoke in the postpartum period [0.8 (0.7, 0.9)]. Smoking relapse did not vary by Medicaid insurance status or WIC participation [1.1 (1.0, 1.3)]. We also observed that women who resumed postpartum smoking were also less likely to breastfeed their infants [3.3 (3.0, 3.8)].

CONCLUSION. Among women who quit nicotine product use during pregnancy, socio-demographic factors influence postpartum relapse. —

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#02 Bolivia

Health System Adaptation to Climate Change in a Globalized Food Chain: A Comparative Study of Quinoa Producers in the Bolivian Andes and Quinoa Consumers in Germany

Lucia Garcia Encinas

ABSTRACT. The globalization of food systems has generated unprecedented connections between geographically distant populations, ecosystems, and economies. This research demonstrates that the integration of Bolivian quinoa into global markets has reshaped local food systems, contributing to regressive dietary substitutions and increasing water stress. Using the telecoupling framework, this study assesses health-related spillovers linking consumer demand in Germany with socio-ecological determinants of health in the Bolivian Altiplano. Findings reveal that despite market pressures, quinoa-producing communities in the Intersalar region exhibit notable resilience. Practices such as reserving quinoa for household consumption, maintaining traditional diets among permanent residents, and collectively investing FairTrade premiums in health and environmental initiatives represent adaptive responses to global market pressures. However, these strategies remain insufficient to fully offset the structural inequalities embedded in the global food system.

KEYWORDS. Telecoupling, quinoa, climate change, nutrition transition, socio-ecological determinants of health, Bolivian Altiplano.

INTRODUCTION. Globalization is a defining paradigm of the twenty-first century, creating complex socio-ecological interactions that reshape local livelihoods. One of the most emblematic examples is the rapid integration of Bolivian quinoa into global markets as a consequence of the boom of the superfood and the healthy global mode, which has transformed traditional production systems through intensification and seasonal migration. In the Bolivian Altiplano, these transformations occur alongside climate change stressors, such as rising temperatures and extreme weather events, that increasingly undermine the social and economic foundations of human health. This paper argues that the health outcomes of quinoa producers cannot be understood in isolation; rather, they are embedded within the transnational commodity chain itself. The objective is to assess the health and environmental implications of this globalization, specifically focusing on the intersection of market cycles, public policy, social response, and environmental change.

CONCEPTUAL FRAMEWORK: TELECOUPLING AND RESPONSIBILITY. The theoretical foundation of this research is situated at the intersection of global

food value chains and the socio-ecological determinants of health (Liu et al., 2013). Understanding globalization's impact on local communities involves a debate between two contrasting perspectives: global determination and geographies of responsibility (Massey, 2004).

The global determination perspective posits that international networks and multilateral institutions are the primary drivers of local outcomes, forcing nation-states and communities to adapt to market demands that operate beyond their direct control (McMichael, 2013). In contrast, the geographies of responsibility framework proposed by Massey (2004) argues that globalization is not an abstract, external force but a relational outcome of actions and connections constructed at the local level. This implies that communities and consumers are intrinsically linked; for instance, the adoption of "sustainable diets" in countries like Germany or the Netherlands has direct social, economic, and health consequences for distant producer landscapes.

To analyze these complex interactions across vast distances, this study utilizes the telecoupling framework (Liu et al., 2013). Telecoupling conceptualizes the socioeconomic and environmental interactions between human and natural systems that are geographically separated. Within this framework, the global quinoa system is divided into three functional components:

1. **The Receiving System:** Germany, where rising demand for organic, plant-based "superfoods" drives consumption to enhance consumer health and environmental sustainability (Hermans et al., 2023; Laroche et al., 2020).
2. **The Sending System:** Bolivia, which supplies the agricultural commodity under specific environmental constraints and social conditions.
3. **Interconnected Flows:** The physical transfer of quinoa, the counter-flow of financial capital, and the circulation of information regarding organic certification standards and health discourses (Liu et al., 2013).

A critical aspect of this framework is the identification of spillover effects – unintended consequences that propagate along the supply chain (Laroche et al., 2020). In the Bolivian Altiplano, these spillovers manifest as increased water stress, soil degradation, and a regressive nutrition transition. Ultimately, the telecoupled relationship between Germany and Bolivia reveals a scalar mismatch in governance; while European trade regulations prioritize product purity and the health of the affluent consumer, they insufficiently account for the risks to food security and resource access in producer communities (Hermans et al., 2023; Newig et al., 2020). Without effective feedback mechanisms, the global trade of quinoa risks functioning as a unidirectional transfer of health benefits from vulne-

#02 Bolivia

Health System Adaptation to Climate Change in a Globalized Food Chain: A Comparative Study of Quinoa Producers in the Bolivian Andes and Quinoa Consumers in Germany

rable producers to receiving systems (Chung & Liu, 2019; Liu et al., 2013).

THE EVOLUTION OF THE QUINOA MARKET CYCLE. Quinoa has transitioned from an ancient subsistence staple for Aymara and Quechua communities to a global commodity. The market cycle followed four distinct stages:

- **Promotion:** Recognition by the FAO in 1986 and the UN's "International Year of Quinoa" (IYQ) in 2013 highlighted its nutritional value and climate adaptability.
- **Boom:** The IYQ triggered a sharp price surge, peaking in 2014, which incentivized an abrupt expansion of cultivated areas and the return of urban migrants to rural communities for harvest.
- **Bust:** By 2014, oversupply and global diversification (with production expanding to over 120 countries) led to a price collapse. Quinoa prices in Bolivia have failed to recover since, exposing smallholders to structural economic vulnerability.
- **Transition:** The current system remains fragmented, with a lack of collective strategy to ensure local communities benefit equitably from the value chain.

PUBLIC POLICIES: A SCALAR MISMATCH. Public policies have actively shaped these market dynamics in both sending and receiving systems.

- **In Bolivia:** The government has integrated quinoa into maternal and

elderly nutritional subsidies, which has increased per capita consumption. However, export-oriented measures focusing on organic certification and "quinoa real" denomination often overlook potential impacts on biodiversity.

- **In Germany:** As Bolivia's main supplier within the EU, Germany perceives quinoa as a component of environmental sustainability. Strict German and EU regulations safeguard consumer health by demanding high physical purity and organic standards free from inorganic substances. This relationship reveals a governance gap: while trade standards prioritize environmental compliance in the receiving system, they insufficiently account for negative spillovers regarding food security and water access in producer communities.

HEALTH SPILLOVERS AND THE NUTRITION TRANSITION. The integration of quinoa into the global market has driven a visible nutrition transition in the Intersalar region. As international prices tripled local values, producers faced a trade-off between maximizing income and household consumption.

- **The Double Burden:** While cash incomes may rise, dietary quality often deteriorates. Refined carbohydrates like rice, pasta, and sugar are replacing nutrient-dense quinoa.
- **Producer Resilience:** Despite market pressures, producers consistently re-

serve one to two quintals of quinoa annually for self-consumption as a form of cultural resistance and food sovereignty.

- **Migrant Health:** Seasonal migrants residing in urban centers like La Paz or Santa Cruz report significantly poorer dietary quality (high fat, ultra-processed foods) compared to permanent residents who maintain diets based on quinoa and llama meat.

ENVIRONMENTAL DETERMINANTS AND WATER STRESS. Telecoupling redistributes environmental burdens. In the arid Altiplano, meeting German organic standards and export demand requires intensified post-harvest cleaning, placing strain on limited water resources. Glacier retreat (40–50% ice volume loss) has reduced natural water regulation, forcing communities to rely on rainwater harvesting and storage tanks. This water scarcity restricts the ability of producers to cultivate vegetables for self-consumption, further worsening dietary variety. Additionally, physically demanding labor and exposure to harsh conditions have led to increased reports of vision and hearing problems among adult producers.

DISCUSSION AND GOVERNANCE IMPLICATIONS. This study demonstrates that the quinoa value chain generates asymmetric health outcomes. The benefits of "sustainable" consumption in the North are spatially decoupled from the social and environmental costs in the South. Bolivian policies, while providing some mitigation through nutritional subsidies, remain largely reactive. For consumer countries like Germany, food policies must extend beyond certification to internalize social and health externalities through nutrition-sensitive trade agreements or strengthened Fair-Trade criteria.

CONCLUSION. The integration of Bolivian quinoa into global markets has reshaped local food systems, contributing to regressive dietary substitution and increased water stress. Addressing these consequences requires moving toward governance models that recognize health, nutrition, and ecological integrity as shared transnational responsibilities. Future research should adopt mixed-methods approaches to assess the long-term health impacts of price volatility and climate change across different producer regions. —

#02 Bolivia

Health System Adaptation to Climate Change in a Globalized Food Chain: A Comparative Study of Quinoa Producers in the Bolivian Andes and Quinoa Consumers in Germany

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#03 Brazil

Critical analysis of torture and cruel treatments and their implication for prison health in Brazil

Caio Cesar Klein

ABSTRACT. This research investigates the systematic production of health “vulnerability” within the Brazilian prison system, analyzing how structural neglect constitutes institutionalized torture. Based on the reports of the National Mechanism for the Prevention and Combat of Torture (MNPCT), the study examines the deprivation of fundamental health rights – access to water, light, and medical care – as deliberate mechanisms of cruel treatment. The results indicate that the carceral environment does not merely host diseases but actively produces them through “normalized” violence. The study concludes that the failure of state custody in providing health is a determining factor of torture, demanding a reevaluation of state accountability.

INTRODUCTION. The Brazilian prison system exists in a state of *chiaroscuro* – an institutional zone where the boundary between legal punishment and illegal torture is deliberately blurred. This investigation starts from the premise that the prison is a phenomenon of difficult analysis and description because, while it hides the real, it simultaneously evidences it through fragments, in a sophisticated interplay of light and shadow, of truth and deception. This *chiaroscuro* is not an administrative failure but an ethical-political fact that exists to mask a reality capable of

causing diplomatic embarrassment and judicial accountability for the Brazilian State. This article provides a critical analysis of torture and cruel treatments, testing the hypothesis that the prison structure is a primary agent of vulnerability. In Brazil, the “penitentiary question” is inextricably linked to a health crisis that is structural. By denying the minimum conditions for biological existence, the State exercises power that transforms the deprivation of liberty into a deprivation of dignity.

MATERIAL AND METHODS. The research adopted a qualitative and exploratory approach, utilizing documentary analysis of official reports from the MNPCT. The primary corpus consisted of technical reports resulting from in loco inspections across several Brazilian states. Content analysis was applied to these documents to identify recurring patterns of structural neglect and institutional practices that foster conditions for torture. The methodology prioritized the observation of environmental factors – such as light, ventilation, and sanitation – and social markers including race, gender, and sexuality to understand distinct processes of violence. This analysis allowed the identification of “units of meaning” by saturation, revealing an institutional narrative about torture written by many hands and from many voices.

RESULTS: THE ANATOMY OF INSTITUTIONALIZED NEGLECT. The data extracted from the reports reveal a catastrophic architecture of health deprivation that characterizes a state of permanent vulnerability:

1. Environmental insalubrity as punishment: overcrowding is not just a spatial issue; it is a health disaster. Cells with no ventilation and a total lack of sunlight are identified as primary vectors for tuberculosis and skin diseases. The deprivation of light and air is used as a tool of control.
2. The weaponization of basic needs: the systematic rationing of potable water is a constant finding. In many units, prisoners are forced to drink water from contaminated sources, leading to chronic gastrointestinal diseases. Similarly, the delivery of spoiled food is described as a method of vulnerability and disciplinary punishment.
3. Absence of medical assistance and “silent torture”: the research identifies a collapse in the provision of health teams. Many units visited had no doctors or nurses for extended periods. Medication, when available, is often withheld or used as a bargaining chip by prison staff, configuring what is defined as torture by omission.
4. Targeted vulnerability: individuals with specific gender identities and sexual orientations face heightened health risks. The lack of specific

protocols for the LGBTI+ population in many units leads to a double punishment: the deprivation of liberty and the forced suppression of their identities through health neglect.

DISCUSSION: TORTURE AS NORMALIZED INSTITUTIONAL PRACTICE. The results confirm that torture in Brazil must be understood as an institutional practice, not an exception. Moving away from the passive concept of “vulnerability,” this analysis adopts the concept of vulnerability. While vulnerability suggests a potential risk, vulnerability denotes an active injury inflicted by the State through its carceral structures. The Brazilian prison does not “fail” to provide health; it actively produces illness to maintain control. When a person deprived of liberty is kept in a dark cell, without water and without treatment for a pre-existing condition, the State is not merely being inefficient; it is practicing torture by omission. This “normalized” violence is what allows the system to persist. The health of the inmates is sacrificed to a punitive logic that views certain bodies as disposable, reflecting a state of “normalized cruelty” that permeates the entire institutional fabric.

OUTLOOK: PREVENTION AND ACCOUNTABILITY. To address this humanitarian crisis and prevent the continuation of cruel treatments, it is urgent to:

#03 Brazil

Critical analysis of torture and cruel treatments and their implication for prison health in Brazil

1. Redefine torture in health terms: recognize health deprivation and structural neglect (lack of water, light, and medicine) as forms of cruel and inhuman treatment.
2. Ensure independent monitoring: strengthen bodies like the MNPCT to ensure that the "obscurity" of prisons is illuminated by external oversight, preventing the concealment of violations.
3. Establish state accountability: move beyond the narrative of "lack of resources" to hold the State and its representatives accountable for the "normalized" violence that degrades the physical and mental health of the carceral population. —

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#04 Georgia

Public Awareness on Health Risk Perception of Outdoor Air Pollution in Tbilisi: An Exploratory Study

Silvia Zanetti, Manizha Khakimova, Nana Katchiuri, Mariam Kevkhishvili, Maka Maglakelidze, Gaby Feldmann, Timo Ulrichs

INTRODUCTION. Air pollution is a major global environmental health risk. Recent estimates attribute between 6.7 and 10 million premature deaths annually to ambient air pollution (IHME, 2023). In Georgia, environmental exposures account for approximately 21% of the total disease burden and 25% of all deaths, highlighting the health impact of environmental risk factors at the national level (Berg & Sturua, 2020). The issue is particularly relevant in Tbilisi, the capital of Georgia, home to approximately 1.08 million people (EBSCO, 2025). Several studies have documented elevated levels of particulate matter and other air pollutants in the city, frequently exceeding recommended WHO guidelines (Baquié et al., 2023). Evidence on public perceptions and behavioral responses to air pollution in Georgia remains limited. A recent mixed-method study conducted across urban and rural areas of Georgia (UNDP & WHO, 2025) found that while awareness of air pollution as a health hazard was high, engagement in protective behaviors was relatively low. However, these national findings do not provide specific insights into how residents of Tbilisi perceive air pollution risks or respond to them in their daily lives. Understanding local knowledge,

attitudes, and practices is important for informing public health communication and tailored intervention strategies. Therefore, the present study examines the knowledge, attitudes, and practices related to outdoor air pollution among adults in Tbilisi. The study addresses the following research question: What do adults in Tbilisi know, believe, and do regarding the health risks of urban outdoor air pollution, and what patterns emerge across demographic, socioeconomic, and health status groups, particularly between individuals with and without chronic conditions?

METHODS. This exploratory cross-sectional study used a Knowledge-Attitude-Practice (KAP) survey to examine knowledge, perceptions, and behaviors related to outdoor air pollution among adults in Tbilisi, Georgia. Data collection was conducted between October 3 and October 27, 2025. Eligible participants were individuals aged 18 years or older who were current residents of Tbilisi. Participants were recruited using a non-probability sampling approach, specifically combining convenience sampling and snowball techniques. Recruitment took place both online and in person across multiple districts of Tbilisi to

enhance sample diversity. Data were collected through a self-administered questionnaire distributed via an online platform (Google Forms) as well as printed copies in public locations. When needed, trained data collectors provided assistance, particularly to older respondents.

The survey instrument was a semi-structured questionnaire available both in English and Georgian. The original version was developed in English and subsequently translated into Georgian by two students from Petre Shotadze Tbilisi Medical Academy. The questionnaire was further reviewed by experts from different disciplinary backgrounds to ensure content validity, clarity, and contextual relevance. Prior to data collection, the survey instrument underwent pilot testing with four individuals from the target population to assess feasibility and comprehensibility. Based on pilot feedback, the questionnaire was shortened and minor revisions were made to the Georgian translation. The questionnaire included sections on sociodemographic characteristics, knowledge of air pollution and its health effects, attitudes toward air pollution, and protective practices. Response formats included multiple-choice questions, Likert-scale items, and open-ended responses.

A total of 234 questionnaires were submitted. Responses with less than 80% completion were excluded, resulting in 225 valid observations included

in the final analysis. Descriptive statistics were used to summarize participant characteristics and KAP outcomes. Associations between variables were explored using statistical tests including chi-square test, ANOVA, and correlation analyses. Statistical significance was set at $p < 0.05$. Given the non-probability sampling strategy, findings are interpreted as exploratory and are not intended to be representative of the broader population.

Ethical approval for the study was obtained from the Bioethics International Committee of the Petre Shotadze Tbilisi Medical Academy. All participants provided informed consent prior to participation.

RESULTS.

1. Sample Characteristics. A total of 225 valid responses were included in the final analysis, collected via mixed-method sampling (56% in-person, 44% online). Participants represented a broad age distribution: 41.5% were 18–29 years, 31.2% were 30–49 years, and 25.9% were 50 years or older. The sample was predominantly female (62.2% vs. 36.4% male) and highly educated, with over 70% holding a university degree. Financially, only 21.8% reported living comfortably; the majority (48.4%) could cover basic needs but not save, while 24% reported experiencing financial difficulties or struggling. Regarding baseline health, 179 participants reported being healthy, whereas

#04 Georgia

Public Awareness on Health Risk Perception of Outdoor Air Pollution in Tbilisi: An Exploratory Study

32 individuals reported living with at least one chronic condition, while 13 respondents preferred not to disclose their health status.

2. Knowledge, Attitudes, and Practices.

The median knowledge score was 8 out of 18 points, indicating moderate levels of awareness regarding outdoor air pollution and its health effects. Women showed slightly higher average knowledge scores (median: 9/IQR: 7–11) than men (median: 7/IQR: 6–10). Knowledge scores were significantly associated with age (correlation test, $p = 0.047$), with younger respondents demonstrating higher knowledge, and with self-reported financial situation (ANOVA, $p = 0.006$), with higher knowledge among individuals reporting a higher self-assessed financial situation.

Attitudes toward air pollution were generally strong across the sample. The median attitude score was 4.25 out of 5, and 79.1% of respondents reported concern about the impact of air pollution on their own health or that of their families. A significant association was observed between concern about air pollution and higher practice scores (correlation test, $p = 0.004$).

In contrast, engagement in protective practices was limited. The median practice score was 3.67 out of 9, indicating relatively low adoption of protective behaviors. However, 68% of all respondents expressed willingness to pay higher taxes if funds are transparently used to reduce air pollution in the city.

Preferred information sources differed across age groups. Among respondents aged 18–39 years, the preferred channel to receive information about air pollution was social media. Among respondents ages 50 years or older, television was the most frequently reported channel.

3. Differences by health status and socioeconomic context. Comparisons between respondents with at least one chronic health condition and those without revealed no statistically significant differences in overall knowledge, attitudes, or practice scores. However, individuals with chronic conditions were significantly more willing to wear a protective mask during periods of air pollution ($2 = 60.97$, $p = 0.009$).

Analysis by socioeconomic situation showed a positive association between self-assessed household financial situation and knowledge scores (ANOVA: $F(4, 220) = 3.040$, $p = 0.018$), with higher knowledge scores observed among participants reporting higher socioeconomic status.

However, significant differences were observed in long-term lifestyle changes based on socioeconomic status (SES). Respondents with high SES showed the highest proportion of protective changes (57.1%), while low-SES respondents most frequently reported taking no action. Regional analysis showed no substantial variation in knowledge or attitudes scores across Tbilisi.

DISCUSSION. This study provides insight into what adults in Tbilisi know, believe, and do regarding the health risks of outdoor air pollution, revealing several patterns. Overall, knowledge levels were moderate (median: 8/18), while attitudes were high (median: 4.25/5), with 79.1% of respondents expressing concern about the health consequences of air pollution on their and/or their families' health. This discrepancy suggests that concern about air pollution may not be solely driven by detailed knowledge, but also by lived experience or general awareness of environmental risks.

Despite high levels of concern, engagement in protective behaviors was limited (median: 3.67/9), indicating a clear gap between attitudes and actions. However, the observed positive association between the level of concern and practice scores ($p = 0.004$) suggests that stronger risk perception may still play a role in motivating behavior, even if overall adoption remains low. This discrepancy may reflect the presence of barriers that were not directly assessed in this study, such as structural or contextual constraints limiting individuals' ability to adopt protective behaviors. Socioeconomic differences emerged as a key determinant of knowledge and behavior. Higher self-reported financial status was significantly associated with greater knowledge ($p = 0.006$), and individuals from higher socioeconomic groups were more likely to report adop-

ting lifestyle changes to protect themselves from the impacts of outdoor air pollution. In contrast, respondents from lower socioeconomic groups reported lower levels of behavioral adaptation, highlighting potential inequalities in both access to information and capacity to respond to environmental risks.

Age-related differences were also observed, with younger individuals demonstrating higher knowledge ($p = 0.047$).

No significant differences in overall knowledge, attitudes, or practices were found between individuals with and without chronic conditions. However, those with at least one chronic condition were more likely to adopt specific protective measures, such as mask use ($p = 0.009$), suggesting situational behavioral adaptation rather than broader differences in awareness.

These findings indicate that while concern about air pollution is widespread in Tbilisi, the translation of this concern into consistent protective behavior remains limited and appears to vary across socioeconomic and demographic groups. These patterns highlight the complexity of the relationship between awareness, perception, and action, suggesting that differences in resources, access to information, and contextual factors may play a role, although these were not directly assessed in this study.

#04 Georgia

Public Awareness on Health Risk Perception of Outdoor Air Pollution in Tbilisi: An Exploratory Study

Implications for Public Health Policy.

The findings of this study suggest that public health strategies addressing outdoor air pollution in Tbilisi should extend beyond awareness-raising efforts and consider how individuals can be supported in translating concern into protective behaviors. Although attitudes toward air pollution were generally strong, the relatively low engagement in protective practices indicates that increasing awareness alone may be insufficient to promote behavioral change.

Differences in knowledge across age and socioeconomic groups highlight the need for targeted communication strategies that use both digital and traditional media to reach diverse populations. In addition, the observed association between socioeconomic status and knowledge and behavior suggests that interventions should consider accessibility to ensure that protective measures are feasible across different groups.

Finally, the willingness of a majority of respondents (68%) to support increased taxation for air pollution control if transparently implemented indicates potential public openness to structural policy measures.

CONCLUSION. This exploratory study highlights how adults in Tbilisi perceive and respond to the health risks of urban outdoor air pollution. The findings show that participants demonstrated moderate knowledge and high levels of concern, but relatively limited engagement in protective practices. Differences across age and socioeconomic groups suggest that knowledge and reported behaviors are not evenly distributed within the sample, while individuals with chronic conditions did not differ significantly in overall knowledge, attitudes, or practices, despite showing greater willingness to adopt some specific protective measures. By applying a KAP framework in this context, the study provides a first baseline of KAP data on outdoor air pollution among adults in Tbilisi. These findings indicate that public health responses should not rely on awareness-raising alone, but should also consider how communication and intervention strategies can better support protective action across different population groups.

Further research is needed to examine the factors influencing the gap between concern and behavior and to build on this baseline with broader and more representative data. —

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#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

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ABSTRACT. Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies examines the important need to rethink how leadership is defined and practiced in global health. The COVID-19 pandemic has shown a serious gap in the responsiveness of health systems around the world, including those seen as highly equipped and advanced. In contrast to the general opinion, many countries with low and medium incomes showed exceptional adaptability and efficiency through the implementation of local solutions. This study contradicts the long standing paradigm, which puts leadership in the hands of high income nations and centralized institutions. Instead, it suggests a transformed model based on inclusion, horizontal cooperation, and mutual learning. Through historical precedents, research, and case studies on structural imbalances in health systems, the project hopes to contribute to the development of a global health frame of justice, robustness, and sensitivity that can efficiently implement future health processes.

KEYWORDS. Global Health Leadership; Crisis Response; Decentralized Health

Systems; Community Engagement; Health Equity; Pandemic Preparedness

INTRODUCTION. Health emergencies and pandemics are not only a medical phenomenon, but also a powerful stress test for global governance, institutional coordination, and systemic equity. The COVID-19 crisis, unprecedented in scale and impact, catalyzed questioning entrenched assumptions about which nations are best positioned to lead during times of crisis. While countries with high incomes were expected to set the standard for pandemic response, many faced significant failures in containment, equity, and public communication. Meanwhile, countries often excluded from decision making forums and panels responded with innovation, effectiveness, and resourcefulness. These events make us question some difficult but necessary doubts: Is the current model of global health leadership adequate? Who gets to lead, and why? What knowledge do we elevate, and what forms of wisdom do we overlook? This study invites a critical and human centered rethinking of global health care. It proposes that effective leadership is not defined by wealth or technological advances that

most high income countries have, but by adaptability, solidarity, and the capacity to integrate various experiences as a whole. As pandemics continue to threaten global stability, there is an urgent need to transition from vertical, hierarchical frameworks to decentralized, inclusive, and collaborative models that reflect the complex realities of a diverse world.

Understanding pandemics and public health emergencies

DEFINITION AND CHARACTERISTICS. There is no universal consensus on the definition of a pandemic. The WHO (World health organization) describes it as a new disease that spreads worldwide, although other definitions emphasize its broad geographic distribution and the large number of affected individuals. More recent perspectives expand this concept by including the overall impact of the event, defining a pandemic as a large-scale infectious outbreak that increases morbidity and mortality and causes significant economic, social, and political disruption. (Madhav et al., 2017) (Ricardo Augusto Dias, 2024) The risk of pandemics has increased due to factors such as globalization, urbanization, environmental changes, and climate change, highlighting the importance of stronger health systems and improved international preparedness. Typically, a pandemic begins as a localized outbreak, spreads regionally,

and eventually reaches global transmission through sustained human to human spread. Public health emergencies refer to situations that require immediate action, often involving the mobilization of resources or temporary restrictions on individual rights. At the international level, a “public health emergency of international concern” is declared when an event poses a risk of cross-border disease spread and requires a coordinated global response. (World Health Organization, 2005)

HEALTHCARE CRISIS MANAGEMENT: CORE PRINCIPLES, APPROACHES IN RESPONDING TO PUBLIC HEALTH EMERGENCIES. A healthcare system in crisis is evaluated by its immediate response capacity and its long-term resilience and the ability to adapt, recover, and improve. Resilience broadens traditional crisis management by promoting proactive, adaptive strategies focused on long-term sustainability and system strength, beyond just reacting and recovering. (Emami, Lorenzoni and Turchetti, 2024) (Boin and McConnell, 2007) Public health emergencies can directly impact all six health system building blocks: Delivery services; Medical commodities; health workforce; governance; information system; financing. (Fridell et al., 2019) There are many approaches to these emergencies, all them being really important for a really effective response, such as:

#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

1. Integrated public health and primary care: During pandemics, investing in public health and primary care improves equity, access, and system performance, enhances emergency response, and helps prevent hospital saturation by supporting frontline services. (Health Systems, 2020)
2. Multisectoral actions: Strengthening collaboration among sectors enabled equity focused financing and governance models that moved beyond narrow, service centered primary care approaches. (Edelman et al., 2021)
3. Communication and partnerships: Humanitarian funding and support reduced crisis impact by compensating for lost resources, lessening disruption, and improving the speed and coordination of response efforts.
4. Use of digital tools: In recent emergencies, digital tools improved access to care through virtual consultations, supported remote service delivery, and enabled communication via supervision, newsletters, and emergency broadcasts.
5. Multidisciplinary health providers.

HISTORICAL EXAMPLES. By previous definitions there have been 22 documented pandemics in world history:

1. Smallpox

Smallpox caused multiple devastating outbreaks throughout history. The Antonine Plague (165 AD) likely caused by smallpox, killed around 20% of the

population of the Roman Empire. After European colonization, smallpox spread throughout the Americas, causing the death of up to 90% of Indigenous populations by the nineteenth century. In 1959, the World Health Organization launched a global eradication campaign. The last case in the Western Hemisphere occurred in Brazil in 1971, and the final natural case worldwide was reported in Somalia in 1977. In 1980, smallpox was officially declared eradicated, making it the only human disease completely eliminated globally. (Fenner et al., 1988)

2. Plague

The plague, caused by *Yersinia pestis*, has produced three major pandemics and is estimated to have killed over 200 million people worldwide: Justinian Plague (541–544 AD), Black Death (1338–1353), Third Plague Pandemic (19th–20th centuries)

3. Cholera

Cholera is one of the oldest recorded infectious diseases, with historical evidence dating back to 400 BC. Since the first pandemic in Asia in 1817, there have been seven cholera pandemics, with the Americas affected during the second pandemic (1826–1851). Improvements in sanitation, access to clean water, and public health education have significantly reduced mortality, which is now below 1% with proper treatment. (CDC, 2025)

Natural disasters, wars, and poor sani-

tation conditions can still trigger outbreaks, particularly in overcrowded environments such as refugee camps.

4. Influenza

Influenza viruses have caused six major pandemics, including: Russian flu (1889–1890), Spanish flu (1918–1919), which infected about one-third of the global population and caused 17–100 million deaths, Asian flu (1957–1958), Hong Kong flu (1968–1969), Russian flu (1977), Swine flu (2009). (Spreeuwenberg, Kroneman and Paget, 2018)

5. AIDS

The HIV/AIDS pandemic, first recognized in 1981, has had major global health and social impacts. The virus was identified in 1983 by research teams at the Pasteur Institute and the U.S. National Institutes of Health. Advances in treatment, particularly antiretroviral therapy, have significantly reduced progression to AIDS and improved life expectancy. The epidemic also increased awareness of safer sexual practices and stimulated global activism related to human rights and healthcare Access. (Faria et al., 2014)

6. Coronaviruses

Three major coronavirus outbreaks have occurred in the 21st century:

a) Severe Acute Respiratory Syndrome (SARS, 2002–2004): about 8,000 cases and 800 deaths

b) Middle East Respiratory Syndrome (MERS, 2012–present): around 2,500 cases with 35% mortality

c) COVID-19 (2019–present): more than 775 million cases. (Killerby et al., 2020)

HEALTHCARE INFRASTRUCTURE AND RESPONSE CAPACITY.

[a] Access to medical technology and information systems. The COVID-19 epidemic exposed the very core of health systems all around, showing how infrastructure and capacity define life or death in times of disaster. Doctors could Zoom into intensive care units across continents in well-connected cities; while in remote areas, even a phone call to a specialist was a privilege. According to Monlezun et al., (2024), the epidemic revealed systemic weaknesses in infrastructure, supply chains, and health systems, stressing the need of modernizing the way care is provided. Digital tools expand a doctor's reach by means of telemedicine and mobile health apps, enabling patients to safely share data and consult from home (Monlezun et al., (2024).

Still, today's reality is conflicting. Many low and middle income countries (LMICs) have limited high-tech resources and just a fraction of their health data is digitized (Filip et al., 2022). The introduction of digitalization not only enhances quality of treatment but also makes access more fair.

#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

[b] Funding and healthcare systems (public vs. private). Preparedness mostly depends on financing and governance. Countries who entered the epidemic with strong public financing and universal health coverage were far more able to withstand shocks and safeguard the vulnerable.

Richer countries had mobilized rescue packages worth roughly 16% of GDP by early 2021, while low-income countries managed only roughly 1.6% of GDP. This discrepancy meant that less developed governments found it difficult to pay medical professionals, equip hospitals, or obtain supplies. Still, creativity and resilience surfaced: many nations established specific budgets and reallocated money, and legislators turned to the business community to close gaps (Chuan De Foo et al., 2023).

These measures rely on transparent governance and real-time information, so that funds reach front-line clinics without delay. When public financing is weak, experts warn that vital services can collapse; they share that countries that entered the pandemic without vigorous health financing systems struggled with the rapid deployment of funds (Chuan De Foo et al., 2023).

[c] Production and distribution capacity for vaccines/medications. A parallel story unfolded in vaccine and drug production. Production chains faced the challenge to keep up with demand,

resulting in disruptions and production delays (Feddemma et al., 2023). Some countries enacted protectionist export bans, meaning that while factories in North America and Europe churned out millions of doses, vast regions of Asia, Africa, and Latin America waited. The result was tragically inequitable: as the Coalition for Epidemic Preparedness Innovations (CEPI) reports, that one of the accelerators for the tragic vaccine inequity during COVID-19, came from the unequal global distribution of vaccine manufacturing capacity (Halabi et al., 2023). Experts have urged that LMICs be equipped with the capacity to develop local vaccine and drug production, so that the world is not entirely reliant on distant hubs (Feddemma et al., 2023).

[d] Community Networks: The Invisible Infrastructure Sustaining the Response. Amid all this machinery, community networks have quietly sustained the response. Neighbors, local groups, and community health workers formed an “invisible infrastructure” that often proved decisive. A village council, a church group, or a set of radio volunteers can disseminate lifesaving information, organize food and medicine deliveries, and encourage vaccination in a culturally sensitive way. These efforts aren’t captured on balance sheets, but they multiply the impact of formal health programs. As one review puts it, communities with strong communica-

tion networks recover more effectively from emergencies (Vandrevala et al., 2024). Only by strengthening both the visible and invisible pillars of health infrastructure, from databases to door-to-door networks, can the world truly break the old paradigm and prepare for the next crisis.

[e] The Centralization of Knowledge and Its Impact on Ineffective Responses. Most notably, the responses to the COVID-19 pandemic emphasize the limitations of centralized knowledge and decision-making in global health emergencies. Rigid, top-down mandates during COVID-19 often proved ineffective against a virus that spreads through complex local dynamics, as exemplified in the United States (Bogdewic & Ramaswamy, 2021). Experience from past epidemics supports this idea. Initially, efforts failed during West Africa's Ebola epidemic as foreign specialists imposed centrally developed protocols that conflicted with local customs, such as burial practices, until community leaders were contacted to adjust strategies. Responses can be adjusted to the different realities on the ground only by decentralizing knowledge sharing data, training, and decision-making authority with regional and neighborhood authorities. This realization is forcing a reconsideration of global health leadership models toward more flexible, context-sensitive frameworks.

[f] Agile and Decentralized Health Systems: The Value of Flexibility. Based on these ideas, many professionals promote agile, decentralized health systems as a pillar of efficient crisis response. Comparative studies show that countries that made substantial investments in decentralizing their health systems usually managed to direct resources where they were most needed at crucial times, thus increasing equity and improving health outcomes (Exemplars News, 2022). Decentralized decision-making allows local officials to rapidly provide medical supplies, hospital beds, or additional personnel to outbreak hotspots without waiting for central clearance. It also promotes creativity and customization; for example, local teams could adapt outreach campaigns or triage guidelines to better align with the language and culture of their community. Several health systems, including those of Senegal, Rwanda, and Nepal, where strong local governance of health services resulted in more flexible and inclusive treatment, have attributed their success to decentralization as their primary reason (Exemplars News, 2022). Occasionally, the absence of central coordination led to fragmentation. For instance, the United States, a highly decentralized health system, saw a chaotic patchwork of state-level responses and one of the world’s highest infection and death rates (Exemplars News, 2022). On the contrary, federal

#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

systems, including empowered local governments, occasionally exceeded what their central governments would have accomplished on their own. In Honduras, for instance, an evaluation demonstrated how better coverage in economically disadvantaged regions resulted from enhancing municipal-level health programs. Managing sanitation supplies and diagnostic equipment directly to frontline professionals, a USAID-supported project, increased COVID-19 prevention and early detection in 41 communities (DAI, n.d.). Bringing decision-making closer to the community level improves the speed and relevance of crisis responses in several regions, like Latin America and the Caribbean.

[g] Impact of Social and Political Factors on Health Management. Pandemic outcomes are not determined by technical capacities or system structures alone; political and social challenges significantly influence the functioning of health systems under emergencies. Studies even suggested that if trust levels had been higher, world infection rates could have been substantially decreased by about 13% (Murukutla & McClelland, n.d.). On the other hand, low-trust surroundings encountered opposition driven by uneven political leadership and the dissemination of false information. For instance, conspiracy theories denying the virus's severity or promoting unapproved cures

led some people to shun testing, refuse masks or social distancing, and later to avoid vaccines. In many countries, healthcare workers had to combat not only the disease but also rumors (for example, that vaccines cause infertility or that hospitals were harming patients), which kept patients from seeking timely care.

Another determinant of pandemic performance is the degree of civic engagement and social solidarity. In countries as disparate as India and Brazil, present networks of community health workers (CHWs) conducted door-to-door symptom checks, distributed medications, and addressed misinformation in neighborhoods, thereby supplementing the overburdened formal health system (The Independent Panel, 2021). In East Asian societies such as Japan and Taiwan, where civic-mindedness and norms of protecting others were strong, there was a high level of voluntary mask usage and mutual aid, with minimal enforcement (The Independent Panel, 2021). Several Native American tribes in the United States proactively closed their reservation borders and implemented their lockdowns during the early stages of the pandemic. This community-driven decision effectively reduced the number of infections in those regions (The Independent Panel, 2021). The efficacy of scientific interventions (vaccines, drugs, diagnostics) relies on public trust and accurate information, highlighting the importance

of addressing the information and engaging society.

SOCIOECONOMIC INEQUALITY AND ITS EFFECT ON CRISIS RESPONSE.

Socioeconomic differences have a profound impact on health outcomes during international crises (Bambra et al., 2020; Ahmed et al., 2020). The COVID-19 pandemic exposed longstanding structural weaknesses in global infrastructure, governance, and health systems. Many low- and middle-income countries (LMICs) struggled with containment, detection, and mitigation due to a combination of poverty, weak state capacity, and ineffective public policy (Marmot et al., 2020). However, the crisis also revealed that high-income countries (HICs) were not immune to structural flaws. Excessive centralization, overreliance on complex digital infrastructure, and chronic underinvestment in primary care contributed to delayed responses and widespread public health failures (Sachs et al., 2022). These patterns underscore the importance of equity and systemic adaptability in shaping effective crisis responses (Moreno-Serra and Smith, 2021).

[a] Governance and Public Policy. Government structure and public policy play a pivotal role in shaping health outcomes during emergencies. Public health programs require not only technical expertise but also clear and coordinated governance.

Countries such as Uruguay, Vietnam, and New Zealand succeeded in minimizing mortality by implementing inclusive, transparent policies and enabling rapid cooperation between sectors (García et al., 2020). These outcomes sharply contrast with the fragmented responses observed in countries with privatized or decentralized health systems, where testing, care delivery, and public communication were often hampered by bureaucratic inefficiencies (Londoño and Frenk, 2021). In several Latin American nations, corruption, austerity, and political instability hindered access to essential supplies and vaccines. Historical patterns of exclusion and social inequality further eroded trust in institutions, complicating the public's adherence to safety measures (Ahmed et al., 2020).

[b] Bureaucracy and Infrastructural Rigidity. One of the critical challenges in effective pandemic response has been the overreliance on centralized, technologically advanced systems that proved too rigid in practice (Murewanhema et al., 2021). While HICs often possess sophisticated digital health infrastructure, these systems sometimes lacked the flexibility necessary for rapid crisis adaptation. Hierarchical decision-making, slow procurement processes, and inadequate engagement with local networks all contributed to delays. In contrast, countries with decentralized health systems often responded faster.

#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

For instance, India's use of Accredited Social Health Activists (ASHAs) and Rwanda's drone-based delivery of medical supplies exemplify how localized, flexible networks can outperform overly complex centralized systems (Singh et al., 2021; Akinola, 2022). This suggests that technological advancement must be accompanied by contextual appropriateness and integration with people-centered systems.

[c] Market-Driven vs. People-Centered Health Systems. The structure of health systems also reflects deeper inequalities in wealth and access. Market-driven health systems often fail to protect the most vulnerable (Woolhandler and Himmelstein, 2021). The United States, despite having the highest per capita healthcare spending globally, recorded among the worst pandemic outcomes. Structural racism, barriers to institutional care, and the absence of universal insurance significantly compromised its ability to mount an equitable public health response (Abelson and Sanger-Katz, 2020). In contrast, countries like Canada and South Korea, with robust public sector leadership and universal access, demonstrated more effective and inclusive pandemic management (Kim and Kim, 2021). Cuba, long isolated by international sanctions, leveraged its long-standing investment in medical education and primary care to roll out rapid public health measures with limited resources.

[d] Cultural Factors and Public Trust. Cultural and economic factors also shaped pandemic outcomes. Public health efforts such as mask-wearing, vaccination uptake, and social distancing required collective action. Cultural norms and trust in institutions significantly influenced public cooperation (Kim and Kim, 2021). In collectivist societies like South Korea and Japan, public compliance with health guidelines was high. Meanwhile, individualist societies, where political polarization and institutional mistrust were widespread, saw more resistance to preventive measures. In countries such as Brazil and the United States, the politicization of the pandemic, misinformation, and disinformation undermined health directives and led to avoidable mortality (Chou et al., 2021; Oliveira et al., 2021). These dynamics underscore the importance of culturally tailored communication strategies and the integration of behavioral sciences in public health planning.

[e] Frugal Innovation and Scalable Solutions. To overcome infrastructural gaps, many countries turned to frugal innovation, developing cost-effective, resource-efficient, and problem-specific solutions (Murewanhema et al., 2021). This approach proved especially vital for LMICs, where limited financial resources and constrained access to international markets made the widespread adoption of high-tech health technologies

unfeasible. During the pandemic, frugal innovations emerged in the form of low-cost ventilators built from accessible components (Shankar et al., 2021), SMS-based contact tracing systems, and community-based telemedicine platforms adapted to remote settings (Aranda-Jan et al., 2021). In many cases, these innovations were not only more scalable but also more effective than their high-cost counterparts.

[f] Structural Justice and Global Health Equity. Frugal innovation also reflects a shift in global health thinking, one that emphasizes relevance, local ownership, and sustainability over expensive technological advancement. These solutions often emerge from collaboration between communities, leveraging local knowledge, materials, and user feedback. They embody a vision of healthcare innovation that aligns with justice, usability, and growth potential. Evidence from global health research suggests that systems grounded in frugal innovation are more resilient, particularly in contexts of chronic resource scarcity. Pandemic case studies confirm this: Kerala's early success in India was rooted in years of public health investment, decentralized governance, and community engagement (Singh and Adhikari, 2020). Vietnam, despite limited resources, rapidly contained early outbreaks through a well-coordinated public system and decisive border closures. In contrast, global vaccine

inequity, where HICs secured early access through pre-purchase agreements while LMICs waited months, illustrates how persistent global inequality undermines solidarity and exacerbates mortality (Le et al., 2020; Wouters et al., 2021; Bollyky et al., 2020).

Conclusions

History has shown that no country is immune to global health threats, and the COVID-19 pandemic, Ebola outbreak, H1N1 flu, and others have demonstrated that. Furthermore, it is clear that no response is ever effective when worked in isolation. Innovative approaches must emphasize continued international collaboration and shared responsibility, not only in vaccine production and delivery but also in data exchange, monitoring, and funding for emergency preparedness. The fragmented response to COVID-19, marked by competition for supplies, limited access to technology in low and middle income countries (LMICs), and vaccine nationalism, needs to be replaced with a more cooperative strategy that prioritizes universal access and coordinated planning. True global solidarity is characterized by resilience everywhere, which depends on resilience everywhere. To move toward such solidarity, the global health community must critically reevaluate the structures of collaboration themselves. Recent crises have shown that the traditional vertical models of cooperation, where high-income countries advise LMICs on how to

#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

respond to emergencies, are not only outdated but often ineffective. These imposed solutions frequently conflict with local realities, as demonstrated during both the COVID-19 pandemic and earlier outbreaks like Ebola. What is needed is a model of horizontal collaboration that treats regional systems and local voices as equal partners. Empowering local actors is not only more culturally effective, but also quicker and more resilient, as seen in numerous community-led actions during the pandemic. New frameworks must prioritize personal dialogue, jointly created protocols, and shared decision-making at all levels.

This necessary shift in partnership models should also lead us to reconsider where innovation and knowledge originate. The prevailing assumption that innovation flows from high-income to low-income countries has been consistently challenged by real-world experiences. Past pandemics have revealed the remarkable creativity, adaptability, and efficiency of community contributions, through flexible budgets, local manufacturing pivots, and quick grassroots solutions. This underscores the need to embrace mutual learning and context-driven adaptation between all health systems. A two-way exchange of knowledge is not only fair but essential to building systems that reflect the diverse strengths of every region.

With collaboration and mutual learning as guiding principles, it becomes clear

that building strategic alliances where everyone wins is not just a possibility, it's a necessity. Pandemics have demonstrated that cooperation among governments, civil society, and the private sector is not only achievable but crucial for an effective response. When health is recognized as a fundamental human right and partnerships are based on trust and mutual benefit, health systems are fortified, and crisis responses become more comprehensive and equitable. Cooperative models ensure that resources and advantages are shared widely, not hoarded by the most powerful or confined to privileged regions.

At the heart of this transformation are the communities themselves. In many places, what began as resistance or mistrust of national and international health policies evolved into leadership, proactive responses, and organized group action. These local networks showed that when social responsibility and shared values are embraced, grassroots initiatives can generate both local and global impact. Real change occurs when every voice, no matter how small, is heard and included in the process.

Looking ahead, the urgency of future crises demands even more resilient and adaptable models of care. These must be grounded in equity, local adaptability, and the strategic use of technology. By investing in primary care, vital services, and trust-based networks,

communities can build the capacity to withstand and recover from emergencies. Solutions developed with and for the people they serve tend to be more equitable, compassionate, and sustainable. However, recognizing what needs to change is only the beginning. A decisive shift requires moving from diagnosis to implementation. If governments fail to acknowledge the weaknesses in their health systems, meaningful development will remain out of reach. Establishing clear standards for care and setting measurable objectives allows for quality assessment and continuous improvement. Falling short of these goals should trigger the creation of policies and collaborative strategies to address gaps, drawing support from all sectors of society to close them.

One of the most urgent gaps is in equitable access to healthcare during emergencies. Centralized health systems have proven inadequate in ensuring fast, fair access for all. In contrast, countries with decentralized systems demonstrated faster and more effective responses during recent pandemics. These systems facilitated better triage, relieved overcrowded tertiary hospitals, and leveraged community trust to boost transparency and engagement. When communities are involved in managing health crises, response times are quicker and outcomes are more positive.

This emphasis on community engagement also reinforces the importance of adaptability in health systems. With emerging diseases, increasing conflict, and ongoing global shifts, another public emergency is not a matter of "if" but "when." Systems must become more agile and resilient by improving infrastructure, expanding workforce capacity, embracing digital innovations, and deepening community ties. Adaptability must become a core value, not an afterthought.

Ultimately, moving from dependency to self-sufficiency requires a transformation in both systems and mindsets. Structural reform alone is not enough. What's needed is a cultural shift that embraces community collaboration, shared responsibility, and locally driven solutions. By challenging paternalistic narratives and placing value on local capacity, equity, and sustainability, we begin to foster systems that truly empower individuals. When people are given the tools, knowledge, and autonomy to influence their own health and futures, self-sufficiency becomes not only possible but sustainable. Changing the narrative is the first, most powerful step toward changing reality, one that leads to enduring, equitable transformation across the global health landscapes. —

#05 Honduras

Breaking the Paradigm: Rethinking Global Health Leadership and Crisis Response in Pandemics and Sanitary Emergencies

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#06 Indonesia

Innovative Digital-Driven Interventions to Enhance Glove Compliance Among Pest Control Technicians: A Quasi-Experimental Study in Samarinda, East Kalimantan, Indonesia

Muhammad Ardi Wijaksana, Lisa Wahidatul Oktaviani, Naufal Faryreza Ryanta, Nida Amalia

ABSTRACT. Pest control technicians face a high risk of developing skin diseases due to chronic exposure to pesticide chemicals, with the incidence of contact dermatitis 2–3 times higher than that of the general population (Aisyah Nabila et al., 2024; Jamin et al., 2024). Although the use of gloves can reduce the risk of exposure to specifications by up to 90% (Ken Ardi Wicaksana, Pertiwi & Rahayu, 2022), compliance rates remain low due to lack of knowledge, perception of discomfort, and inadequate occupational safety education (Masyarakat & Sriwijaya, 2022). This quasi-experimental study in CV. Pestex Indonesia Mandiri conducts comprehensive intervention impacts that include virtual safety briefings, situation simulations, skills training, and digital sustainability monitoring to improve glove compliance. Initial observations showed a compliance rate of only 33% among technicians, which later increased to 67% after the intervention. This is supported by active participation in internal safety WhatsApp groups and the use of self-check photo documentation (Arindi & Priyanto, 2022; Urzais & Handoko, 2024). In addition, technicians showed better glove use understanding and skills (80–90%) after training

(Deitra Qharizah Ananda, Gafur & Sididi, 2023). This intervention effectively overcomes geographical barriers through digital tools and encourages changes in occupational safety behavior (Nasrullah, 2014). These findings highlight the potential of integrated digital and behavioral strategies to transform occupational health practices in high-risk industries, as well as offer a replicable model for improving compliance with personal protective equipment (PPE) and occupational safety standards (Korneilis & Gunawan, 2018).

KEYWORDS. Compliance with the use of gloves; pest control technicians; occupational safety and health (K3); virtual safety briefing; situational simulation; digital-based interventions; Behavioral monitoring; personal protective equipment (PPE); skin diseases due to pesticides; digital transformation of occupational safety.

INTRODUCTION. Pest control workers are chronically exposed to pesticide chemicals that can cause skin disorders such as dermatitis, with a risk 2–3 times higher than the general population (Jamin et al., 2024; Aisyah Nabila

et al., 2024). This disease not only impacts health but also work productivity. The use of personal protective equipment (PPE), especially gloves, has been shown to reduce pesticide exposure by up to 90% when used correctly (Ken Ardi Wicaksana, Pertiwi & Rahayu, 2022). However, the level of compliance in its implementation is still low due to the lack of education, perception of work comfort, and lack of supervision and effective safety management systems (Ningsih & Ferijani, 2020; Society & Sriwijaya, 2022). Digital education-based approaches such as virtual safety briefings and situational simulations have been proven to be effective in increasing safety awareness and behavior (Arindi & Priyanto, 2022; Urzais & Handoko, 2024).

METHOD. This study applied a quasi-experimental design involving all CV pest control experts. Pestex Indonesia Mandiri as a participant. The series of interventions is structured in three main stages that are structured to increase awareness and compliance with the use of personal protective equipment, in particular gloves. The first stage is in the form of a virtual safety briefing which is carried out through a bold session with the aim of increasing technical knowledge about pesticide risk exposure and the urgency of applying occupational safety principles (Arindi & Priyanto, 2022). The second stage includes skills training and hands-on situational simulations based on hands-on practice to strengthen technicians' understanding and ability to select and use gloves in accordance with safety standards (Deitra Qharizah Ananda, Gafur & Sididi, 2023). Furthermore, the third stage includes the implementation of a continuous monitoring system through the internal WhatsApp group "Safety First Pestex", which functions as a means of two-way communication, peer support, and independent photo documentation media to verify lectures on the use of gloves (Nasrullah, 2014). Data collection was carried out in a triangulation manner through field observation, in-depth interviews, visual documentation, and Filling out a skin health evaluation checklist by technicians. Baseline data were collected



Picture 1.1
Technician
Work
Activities

#06 Indonesia
Innovative Digital-Driven Interventions to Enhance
Glove Compliance Among Pest Control Technicians:
A Quasi-Experimental Study in Samarinda
East Kalimantan, Indonesia.

before the intervention, while follow-up data was obtained during and after the implementation of the program to produce changes in the level of compliance and health conditions of workers' skin (Ab, Jaya & Ningsi, 2024).

ment in the aspects of behavior and safety awareness. The participation of technicians in safety WhatsApp groups increased from 50% to 100%, which played a role in strengthening social support as well as expanding access to

Aspect	Details
Design	Quasi-experimental, pre-post
Participants	Total sampling; technicians from the organization CV Pestex Indonesia Mandiri
Intervention	1) Virtual safety briefing; 2) Glove training + situational simulation; 3) Monitoring group "Safety First Pestex" on the mobile app WhatsApp
Data Collection	Observation, interview, visual documentation, skin health checklist
Data Timing	Baseline (pre), follow-up (during, post)
Outcome Indicators	Glove compliance, proper glove-use skills, skin health status

Table 1.1
Intervention
Stages and
Research
Method
Overview

RESULTS. Preliminary observations showed that only two out of six technicians (33%) used gloves consistently in accordance with occupational safety standards. The main problems identified include low levels of compliance with the use of personal protective equipment (PPE), complaints of respiratory distress due to exposure to chemicals, and potential musculoskeletal disorders (MSDs). These factors are largely influenced by workers' limited knowledge of skin health risks caused by pesticide exposure (Masyarakat & Sriwijaya, 2022). After the implementation of the intervention was carried out, there was a significant improve-

occupational safety information. Technicians' understanding of the function of gloves and the urgency of implementing safety practices increased by up to 90%, driven by the success of the "Glove Safety Warrior" training program that effectively improved workers' practical skills, with 80–90% of technicians able to correctly implement the use of gloves (Ken Ardi Wikaksana, Pertiwi & Rahayu, 2022). The compliance rate with the use of gloves increased from 33% to 67%, as verified through photo documentation and skin health evaluation self-checklist (Jamin et al., 2024). The self-evaluation mechanism also contributes to the tech-

nician's ability to detect potential skin disorders early and take appropriate preventive measures. Although there are still two doctors who have not shown optimal presentations, digital systems have proven to be effective in strengthening awareness, discipline, and building a sustainable workplace safety culture in the company environment (Urzais & Handoko, 2024)

to overcome geographical challenges while supporting sustainable behavior change and strengthening the workplace safety culture. The intervention model developed can be used as a reference for adaptation by similar companies to improve the safety and health of workers in high-risk industries.

KEYWORDS. Glove compliance, pest control technician, virtual safety brie-



Picture 1.2
Implement-
ation of
Work Safety
Programs

CONCLUSION AND IMPLICATIONS. The implementation of comprehensive interventions that included virtual safety briefings, practical skills training, and digital monitoring was proven effective in improving glove compliance among pest control officers. This integrative approach not only improves the health of workers directly, but also improves occupational safety standards in the company environment. The strategic use of digital technology is able

ing, situational simulation, occupational health intervention, personal protective equipment (PPE), digital monitoring, occupational health behavior, Pesticide-induced skin diseases, industrial occupational safety, quasi-experimental studies, digital transformation in occupational health, risk reduction of chemical exposure, digital health technology, occupational safety education. —

Indicator	Baseline	Post-intervention
Glove compliance	33%	67%
Participation in WhatsApp group	50%	100%
Understanding of glove safety	< 50%	90%
Proper glove use skills	-	80 - 90%

Table 1.2 Pre–Post Intervention
Outcome Indicators on Glove
Compliance in Pest Control
Technicians in Samarinda

#06 Indonesia

Innovative Digital-Driven Interventions to Enhance Glove Compliance Among Pest Control Technicians: A Quasi-Experimental Study in Samarinda East Kalimantan, Indonesia.

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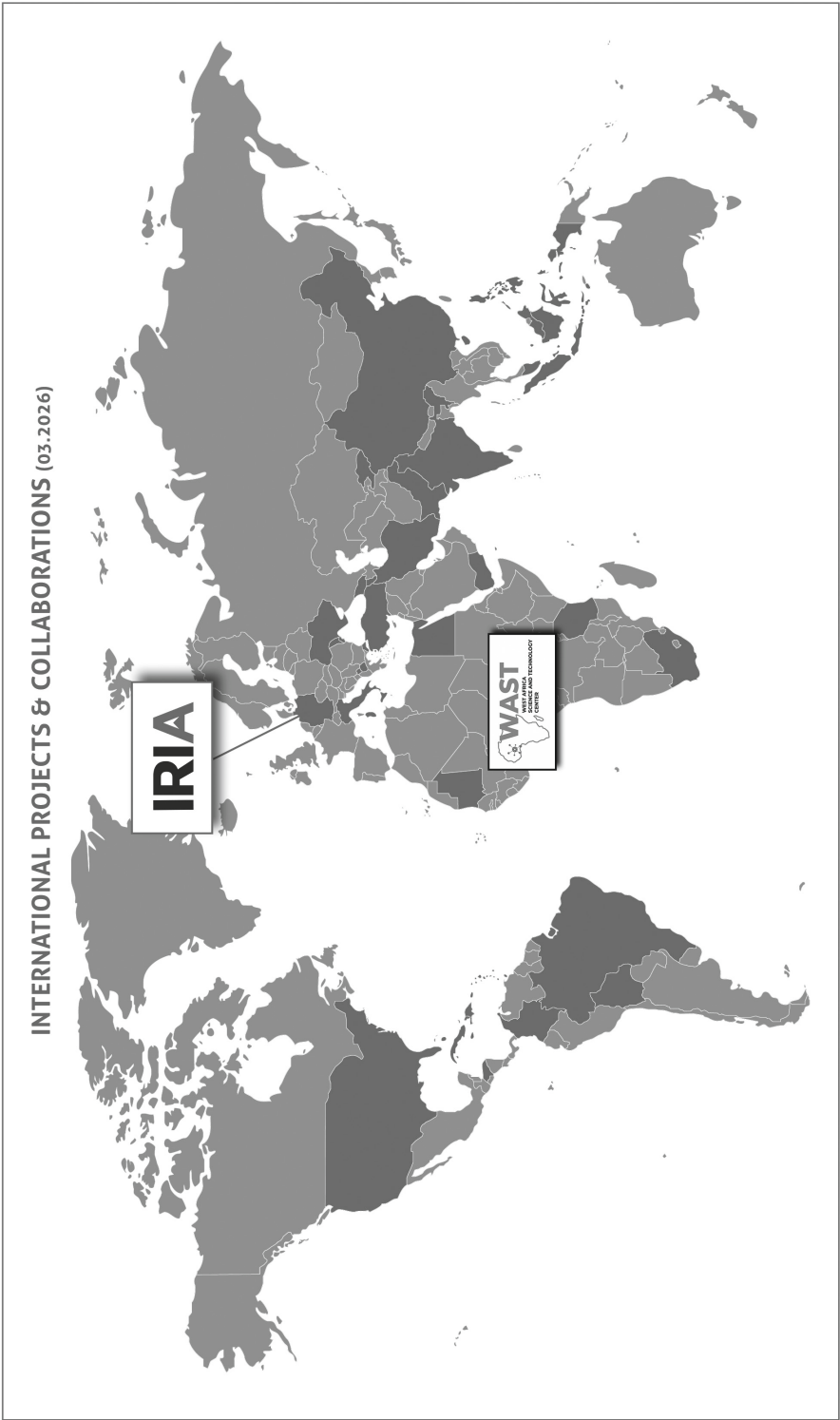
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#07 Malaysia

Enhancing Emergency Care in Resource-Limited Settings in Sabah, Malaysia

Lo Zhen Zhen

INTRODUCTION. In rural and remote areas, access to diagnostic imaging and laboratory services remains limited. Hospitals in these settings often face challenges, including a shortage of equipment and staff. These issues may delay diagnosis and treatment in emergency care. Point-of-care ultrasound (POCUS) offers a practical and sustainable solution due to its portability, rapidity, repeatability, and cost-effectiveness. By enabling real-time bedside assessment and procedural guidance, POCUS bridges critical diagnostic gaps and enhances clinical decision-making in resource-constrained emergency settings.

OBJECTIVES. The Kembara POCUS Sabah initiative, "Confidence & Clarity with Point-of-Care Ultrasound," was developed to strengthen emergency diagnostic capacity in rural healthcare settings. Its objectives were to: (1) build basic POCUS proficiency and clinical application skills among healthcare providers; (2) enhance diagnostic accuracy and facilitate timely patient referral; and (3) promote the safe and effective use of POCUS in clinical practice.

METHODOLOGY. In 2024, the Kembara POCUS Sabah programme was implemented across five district hospitals in Sabah, Malaysia, as a structured

capacity-building initiative. A total of 118 participants, comprising medical officers, house officers, medical assistants, and staff nurses from both the government and private sectors, were trained. The programme used a blended learning approach combining short lectures, live demonstrations, and supervised hands-on training. Training focused on key emergency protocols, including FAST (Focused Assessment with Sonography in Trauma), BLUE (Bedside Lung Ultrasound in Emergency), and RUSH (Rapid Ultrasound in Shock and Hypotension). Participants worked in small groups under expert supervision to practise image acquisition, interpretation, and documentation.

RESULTS AND DISCUSSION. The programme successfully enhanced participants' knowledge, technical proficiency, and confidence in applying POCUS, resulting in improved diagnostic accuracy and more timely referrals in rural emergency settings. The initiative also strengthened collaboration between emergency physicians and rural practitioners. Participant feedback was highly positive, with recommendations for regular continuation to support sustained skill development.

CONCLUSION. POCUS is an effective tool to address diagnostic gaps in resource-limited settings. The Kembara

POCUS Sabah initiative demonstrates that structured training and interprofessional teamwork can strengthen diagnostic capacity, facilitate timely decision-making, and enhance patient outcomes in rural and remote healthcare systems.

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KEYWORDS. Point-of-care ultrasound, emergency medicine, rural healthcare —

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#08 Pakistan

Perceived Causes and Effects of Overcrowding among Emergency Healthcare workers in Azad Jammu and Kashmir

Fatima Noreen

ABSTRACT. Background. Overcrowding in emergency departments (EDs) has become a major problem for healthcare professionals throughout the world, negatively impacting staff effectiveness, patient outcomes, and hospital efficiency. This study aims to identify the healthcare workers' perceived causes and impact of overcrowding in the EDs of public sector hospitals in Azad Jammu and Kashmir.

METHODS. A cross-sectional design was employed in the current study. Using the convenient sampling technique, 160 health care workers including doctors, nurses, and technicians were interviewed who were working within the emergency departments of selected hospitals in AJK. A previously validated structured questionnaire was used to collect data. A three-point Likert scale was used to evaluate the responses.

RESULTS. High internal consistency was shown by both parts of research tool being used in the study ($= 0.87$ for perceived effects and 0.82 for perceived causes). The findings showed that the primary perceived causes of ED overcrowding were unnecessary visits due to lack of standard procedures ($M = 2.05$; $SD = 0.76$), lack of ED inpatient beds ($M = 2.00$; $SD = 0.72$) and pro-

longed stay in the ED ($M = 1.95$; $SD = 0.77$). The perceived effects of overcrowding were increased stress and burnout among Healthcare Professionals ($M = 1.99$; $SD = 0.75$), increased total length of stay in the hospital ($M = 2.06$; $SD = 0.78$) and decreased ED staff productivity ($M = 1.93$; $SD = 0.74$).

CONCLUSION. Overcrowding results from unnecessary visits caused by a lack of regular operating procedures. Patients may have to wait longer, which could make their symptoms worse and keep them in the hospital longer. The effects are substantial and detrimental for both patients and healthcare professionals. Healthcare workers who work in crowded places are more likely to feel stressed and burned out. Based on the results of this study, a complete plan of action can be made to deal with overcrowding in the emergency department and its detrimental impact on the patients, employees, and the overall efficiency of the department.

INTRODUCTION. Overcrowding in emergency departments (EDs) is a global issue that has been around for a long time (Morley et al., 2018). The emergency department (ED) is an imperative part of the hospital because it serves the general public and gives quick care to people who are in serious

condition and need emergency care (Rasouli et al., 2019). Patients who are seriously injured or sick need to be seen right away and given priority. But the ED often gets too crowded because of the large number of people who come in with non-urgent illnesses (Butun et al., 2023). Prompt access to medical services and treatment is crucial for patients. The outcomes for patients are enhanced when they receive high-quality emergency medical care. However, problems like overcrowding make it difficult to provide prompt and appropriate care. Patient outcomes, ED performance, and staff especially nurses, who make up the majority of ED staff are all adversely impacted by this (Guerrero et al., 2024).

One of the biggest reasons for this overcrowding is that people come to the emergency room even when their condition is not serious. Many patients use the ED as a regular clinic because they don't know where else to go or don't have access to primary healthcare. Also, the shortage of inpatient beds makes it difficult to admit patients quickly, which leads to longer stays in the ED (Barrett et al., 2022). Emergency department overcrowding results in numerous negative consequences, such as longer patient waiting times, treatment delays, and higher rates of mortality and morbidity. Research has shown that overcrowding is a worldwide issue, exerting substantial adverse effects on both patient care

and hospital functioning (Savioli et al., 2022). In order to prevent their conditions from getting worse, patients who seek emergency medical assistance in emergency departments should obtain the essential emergency care as soon as possible (Guerrero et al., 2024). The hospital as a whole must work together to regulate the flow of patients in the ED in order to safeguard patient safety in overcrowded EDs (Jun et al., 2025).

MATERIALS AND METHODS. A descriptive cross-sectional approach was employed to collect data. This study was conducted at the EDs of public sector hospitals in Azad Jammu and Kashmir. Using the convenient sampling technique, 160 health care workers, including doctors, nurses, and technicians were interviewed working within the emergency departments of selected hospitals in AJK. A previously validated structured questionnaire was used to collect data. The first part of research tool containing ten items assessed the perceived causes of ED overcrowding while the second part of research instrument, having 14 items assessed the impact of ED overcrowding. Both scales were measured on a three-point Likert scale (3=agree 2=neutral, and 1=disagree). The reliability of the surveys was assessed using Cronbach's.

Results. The majority of respondents stated that key causes of overcrowding were a lack of inpatient beds in

#08 Pakistan

Perceived Causes and Effects of Overcrowding among Emergency Healthcare workers in Azad Jammu and Kashmir

the ED (77.5%), longer patient stays (73.75%), and an insufficient number of on-duty ED healthcare personnel (70.0%). The causes were ranked as follows: "unnecessary visits due to a lack of standard procedures" (M = 2.05; SD = 0.76), "lack of ED inpatient beds" (M = 2.00; SD = 0.72), "prolonged length of stay in the ED" (M = 1.95; SD = 0.77) and "lack of attending ED healthcare professionals on shift" (M = 2.06; SD = 0.76). Overall, the lack of ED inpatient beds was thought to be the main source of overcrowding, whereas scheduling conflicts for surgeries were thought to be the least important factor. The consequences of overcrowding were categorized as follows: "increased stress and burnout among Healthcare Professionals" (M = 1.99; SD = 0.75), "increased total length of stay in the hospital" (M = 2.06; SD = 0.78), "high staff turnover" (M = 2.06; SD = 0.75) and "decreased ED staff productivity" (M = 1.93; SD = 0.74).

DISCUSSION. The current study sought to determine the main causes and consequences of overcrowding in the emergency departments of public hospitals in AJK as perceived by healthcare professionals. Most respondents recognized that a lack of inpatient beds (77.5%), extended patient stays (73.75%), and a lack of on-duty ED healthcare personnel (70.0%) and unnecessary visits (65.0%) were the primary reasons of ED congestion. Ad-

ditionally, higher stress levels, burnout, and increased staff turnover were the main observed consequences of overcrowding.

The main effects of overcrowding that have been identified were higher stress and burnout among staff, longer hospital stays, and high turnover rates. These findings align with a prior study conducted by Guerrero et al. (2024), which highlighted burnout as a critical consequence of excessive work demands. A substantial level of stress and burnout leading to job disappointment has been recognized as the main factor behind staff reductions in the emergency department, attributed to the issue of overcrowding (Sartini et al., 2022). Furthermore, the predominant source of stress within the emergency department stems from the continuous influx of patients and their families, which significantly contributes to nursing burnout (Rozo et al., 2017). Overcrowding in emergency departments leads to high death rates and unsatisfactory patient treatment (Badr et al., 2022). As a result, hospitals ought to give top priority to creating plans to lessen the issues and possible consequences of overcrowding on the health of patients and emergency department personnel (Lindner et al., 2021). The consequences are profound, negatively impacting both healthcare providers and patients. Healthcare workers who perform duties in overcrowded environments have higher levels of stress and burnout. A

detailed strategic proposal to address ED overcrowding and its consequences on patients, healthcare professionals and ED influx can be developed using the study's findings. To lessen the detrimental impacts of overcrowding, it

is essential to determine the primary reason. Organizational management and leadership should take the required steps to decrease staff turnover, enhance emergency care quality and improve patient outcomes and satisfaction. —

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#09 South Africa

Climate change and primary health care in Africa: a scoping review

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ABSTRACT. BACKGROUND. Climate change is one of the biggest threats to global health and primary health care (PHC). In Africa, building climate resilient PHC is a challenge as there is little evidence to inform health systems and policymakers.

OBJECTIVE. To determine the extent of the literature on climate change and PHC in the African context and identify knowledge gaps.

METHODS. A scoping review systematically searched the published and grey literature (2010-2021) including six databases (Scopus, Pubmed, Cinahl, Africa Wide, Web of Science, and Open Grey) and research repositories from prominent African universities. A comprehensive search strategy and data extraction from included studies were used. Data were analyzed both quantitatively and qualitatively.

RESULTS. A total of 1242 studies were identified and 12 included. Most of the articles were published from 2016 onwards. Publications came from five countries, with South Africa and Gha-

na having more than one. Most studies were narrative reviews or descriptive studies, using qualitative interviews or surveys. PHC services in Africa will experience increasing challenges of malnutrition, infectious diseases, heat-related conditions, injuries, non-communicable diseases, mental health problems and migration. However, there is an absence of actual surveillance or monitoring data. Only one study focused on the use of renewable energy as a means of resilience and mitigation. There was no study on health financing implications.

CONCLUSION. The literature is accruing on climate change and health in the African context, but there is a lack of evidence on climate resilient PHC.

RECOMMENDATIONS. Ten priority research questions were identified. Future research should address the knowledge gaps across the 10 point WHO framework for climate-resilient health systems.

KEYWORDS: Climate change, primary health care, Africa. —

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10 South Africa

Promoting Inclusive African Indigenous Knowledge Systems-Based Disaster Trauma Risk Reduction Management for Sustainable Futures

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ABSTRACT. Africa experiences disproportionate exposure to climate-related disasters and their associated psychosocial impacts, yet African communities have long cultivated Indigenous Knowledge Systems (IKS) that enable adaptive resilience, collective healing, and culturally grounded governance. This article advances a comprehensive framework for African Indigenous Knowledge Systems-based Disaster Trauma Risk Reduction Management (DRR-Trauma), developed through initiatives of the African Institute in Indigenous Knowledge Systems and presented at the International Young Researchers' Symposium on Global Health at Akkon University, a satellite of the World Health Summit. The framework reconceptualizes resilience as a cultural construct, trauma recovery as a collective process, and disaster governance as a pluralistic knowledge domain integrating indigenous and scientific systems. Drawing on comparative African community practices, participatory methodologies, and culturally grounded trauma healing modalities, the article demonstrates how inclusive knowledge governance enhances disaster preparedness, recovery effectiveness, and epistemic justice. The analysis further integrates gender intersectionality, policy transformation, and community leadership as structural

requirements for sustainable futures. The article argues that integrating IKS into disaster risk governance is not optional but essential for equitable global health, climate justice, and long-term resilience.

INTRODUCTION. The growing intensity and frequency of climate-related disasters have created significant challenges for communities across the globe. Extreme weather events such as floods, droughts, wildfires, and storms are increasingly affecting vulnerable populations, particularly in regions where socioeconomic inequalities and environmental pressures intersect. In many African contexts, these disasters not only cause physical destruction but also generate long-term psychological and social trauma that affects community wellbeing and resilience. Traditional disaster risk reduction frameworks have largely relied on scientific modeling, technological monitoring systems, and centralized policy responses. While these approaches have contributed significantly to hazard monitoring and disaster preparedness, they often overlook the valuable knowledge embedded within Indigenous communities. Indigenous Knowledge Systems (IKS) encompass accumulated understandings of environmental processes, social organization, and cultural practices

that have evolved through generations of lived experience (Berkes, 2018).

In African societies, Indigenous knowledge has historically played a crucial role in environmental management, agriculture, weather forecasting, and community governance. These knowledge systems often include detailed observations of ecological indicators, animal behavior, seasonal cycles, and atmospheric patterns that enable communities to anticipate environmental changes and respond to potential hazards (Iloka, 2016). Such practices illustrate how Indigenous knowledge functions as an adaptive system that supports resilience in the face of environmental uncertainty. Despite their relevance, IKS have frequently been marginalized within formal disaster governance structures. Colonial legacies and dominant scientific paradigms have contributed to the perception that Indigenous knowledge is informal or less reliable than scientific knowledge. However, contemporary scholarship increasingly recognizes that integrating Indigenous and scientific knowledge systems can enhance disaster risk reduction strategies by combining complementary perspectives and expertise. This article explores how African IKS (AIKS) can contribute to disaster trauma risk reduction management and sustainable development. It emphasizes the importance of knowledge pluralism, community participation, and culturally grounded resilience strategies in ad-

ressing the complex challenges posed by climate change and disaster risk.

Epistemological Foundations of Indigenous Knowledge Systems in Disaster Governance. Indigenous Knowledge Systems refer to bodies of knowledge, practices, and beliefs that are developed and sustained by local communities through long-term interactions with their natural and social environments. These systems are dynamic and adaptive, evolving over time as communities respond to environmental changes and social transformations (Berkes, 2018). Unlike conventional scientific knowledge, which is often produced within formal research institutions, Indigenous knowledge is embedded in everyday life and transmitted through cultural practices, oral traditions, and intergenerational learning processes. Storytelling, rituals, songs, proverbs, and apprenticeship systems are common mechanisms through which knowledge is shared and preserved within communities. Importantly, IKS are holistic in nature. They do not separate environmental, social, and spiritual dimensions of knowledge but rather view them as interconnected components of a broader ecological worldview. This holistic perspective enables communities to develop integrated strategies for managing natural resources, maintaining social cohesion, and responding to environmental challenges.

#10 South Africa

Promoting Inclusive African Indigenous Knowledge
Systems-Based Disaster Trauma Risk Reduction
Management for Sustainable Futures

African IKS are characterized by relational epistemologies that emphasize interconnectedness between humans, nature, and spiritual dimensions of existence. Knowledge is therefore not simply an accumulation of facts but is embedded within cultural values, ethical principles, and collective identities. Scholars have identified several key characteristics of IKS, including their contextual specificity, experiential basis, and adaptive nature. Indigenous knowledge is deeply rooted in local environments and cultural traditions, making it highly relevant for addressing context-specific challenges such as climate variability and disaster risk. Floods, droughts, cyclones, and wildfires increasingly affect vulnerable communities whose resilience is shaped by historical inequalities and environmental degradation (Nyahunda & Tirivangasi, 2019; Nhemachena et al., 2020). These disasters generate complex forms of trauma that extend beyond immediate physical destruction, affecting cultural systems, social cohesion, and community wellbeing. IKS emphasizes collective responsibility and community participation in decision-making processes. Such participatory approaches are particularly relevant in disaster risk reduction, where community engagement is essential for effective preparedness and response.

Reconceptualizing Disaster Trauma within Indigenous African Knowledge

Systems. Conventional disaster risk reduction frameworks have primarily relied on technological monitoring systems and centralized governance structures. While these approaches remain important, they often overlook IKS that have supported local cultural communities for generations (Chirima, 2025). IKS has long played a central role in helping communities anticipate, prepare for, and respond to environmental hazards. In many African contexts, local communities rely on ecological indicators such as animal migration patterns, plant phenology, and atmospheric conditions to forecast weather changes and potential disasters (Motsumi. & Nemaconde, 2024). Research conducted in southern Africa demonstrates that IKS can complement scientific early warning systems by providing localized insights into environmental dynamics (Dube & Munsaka, 2018). African IKS provides culturally grounded mechanisms for understanding environmental change, anticipating hazards, and facilitating recovery processes. Within many African IKS, trauma is conceptualized as a disturbance of communal harmony rather than solely an individual psychological condition. Disasters disrupt social networks, spiritual relationships, and ecological balance, producing collective experiences of loss and disorientation. Psychological distress is therefore understood within a broader relational context. This socio-centric unders-

tanding reframes disaster recovery as a communal process of restoration. Healing involves rebuilding social cohesion, re-establishing moral order, and renewing relationships with land and ancestors. The emphasis on collective restoration expands the scope of trauma management beyond clinical intervention.

Importantly, IKS contributes to disaster recovery processes by supporting psychosocial healing and social cohesion. Cultural rituals, storytelling, and communal gatherings provide spaces for communities to process trauma, rebuild social networks, and restore a sense of collective identity following disasters. Comparative analysis of African traditional practices reveals several recurring mechanisms for trauma recovery that reflect holistic conceptions of wellbeing (Bol & Van Niekerk, 2024). Ritual and ceremonial processes function as structured communal responses to disruption. Through public acknowledgment of loss, symbolic purification, and restoration of relational balance, rituals provide culturally meaningful frameworks for emotional expression and collective mourning. Narrative and storytelling practices enable communities to interpret disaster experiences within shared meaning systems. Collective narration transforms individual suffering into communal memory, reducing isolation and reinforcing social cohesion. For example, farmers in rural Zimbabwe have historically used

environmental indicators such as the flowering of certain tree species or changes in bird behaviour to anticipate seasonal rainfall patterns (Gwenzi et al., 2016). These systems facilitate rapid information sharing and coordinated responses that strengthen community resilience.

Embodied healing modalities such as music, dance, and rhythmic participation facilitate emotional release and psychosocial integration. These practices engage the body as a site of memory and recovery, recognizing trauma as both psychological and physiological (Corriero et al., 2024). Spiritual consultation provides explanatory frameworks that restore meaning and agency. By identifying perceived sources of imbalance and guiding corrective action, spiritual processes contribute to psychological stabilization. Together, these modalities demonstrate that trauma recovery within IKS is relational, embodied, and culturally mediated.

Indigenous African Practices in Hazard-Specific Disaster Risk Reduction. African IKS include context-specific strategies for hazard anticipation and response developed across diverse ecological environments. These practices demonstrate sophisticated environmental knowledge and adaptive governance structures. Flood risk management incorporates observation of hydrological patterns, vegetation changes, and animal behaviour. Sett-

#10 South Africa

Promoting Inclusive African Indigenous Knowledge
Systems-Based Disaster Trauma Risk Reduction
Management for Sustainable Futures

lement planning, seasonal mobility, and community warning systems are informed by ecological indicators embedded within local knowledge traditions (Bwambale et al., 2018). Drought resilience strategies include water conservation practices, pastoral mobility, and ecological forecasting based on environmental signals. These adaptive mechanisms regulate resource use and support long-term sustainability. Scholars have noted that culturally embedded healing practices play an important role in strengthening resilience after disasters. Community-based rituals and collective storytelling provide opportunities for individuals to express grief and reconstruct meaning following traumatic experiences (Saul, 2022). These processes help communities integrate traumatic events into collective memory while reaffirming cultural values and social bonds.

In many Indigenous contexts, trauma is not viewed solely as an individual psychological condition but rather as a disruption of relationships between people, communities, ancestors, and the natural environment. Healing therefore involves restoring balance across these interconnected domains. Such holistic approaches to wellbeing align closely with broader conceptualizations of resilience that emphasize social connectedness, cultural continuity, and collective coping mechanisms. These practices illustrate that IKS-based disaster risk reduction systems integrate

environmental knowledge, social governance, and cultural regulation within comprehensive adaptive frameworks.

Methodological Architecture for Inclusive IKS-Based DRR-Trauma.

The integration of IKS into disaster governance requires methodologies that respect community agency, cultural integrity, and epistemic equity. Community-Based Participatory Research positions communities as co-producers of knowledge. Research processes are collaboratively designed, implemented, and interpreted, ensuring that knowledge generation remains accountable to community priorities (Taliep et al., 2022). Indigenous Knowledge Ethno-Mapping documents spatial knowledge of hazards, resources, and cultural sites. Participatory mapping preserves ecological knowledge while supporting disaster planning. Reciprocal Knowledge Blending facilitates structured dialogue between Indigenous knowledge holders and scientific practitioners. This process emphasizes mutual learning rather than knowledge extraction. Action-oriented piloting implements co-designed strategies within real-world contexts, enabling iterative adaptation based on community feedback and practical outcomes. These methodologies collectively operationalize knowledge pluralism and cultural safety within disaster governance. When these knowledge systems are integrated through collaborative fra-

meworks, they can produce more comprehensive and context-sensitive approaches to disaster governance.

Knowledge pluralism acknowledges that scientific and IKS offer different but complementary forms of understanding. When combined through participatory processes, these knowledge systems can generate more comprehensive and contextually relevant solutions (Hoppers, 2025). Participatory approaches to disaster governance involve engaging communities as active partners in risk assessment, planning, and decision-making. Such approaches recognize that local communities possess detailed knowledge of their environments, social networks, and cultural practices. By incorporating this knowledge into disaster planning, policymakers can develop strategies that are more locally appropriate and socially legitimate. Research on community-based disaster risk reduction demonstrates that participatory processes improve the sustainability and effectiveness of resilience initiatives. When communities are involved in designing and implementing disaster preparedness strategies, they are more likely to trust early warning systems, adopt risk reduction measures, and mobilize collective action during emergencies (Lunga et al.; 2025).

Gender Intersectionality in Indigenous Disaster Governance. Disaster experiences and recovery processes are

shaped by gendered roles, social expectations, and differential access to resources. Women often serve as primary caregivers and custodians of ecological and social knowledge, contributing essential insights into community wellbeing and resilience strategies. At the same time, they may face increased vulnerability following disasters (Manatsa et al., 2025). Men may encounter social norms that constrain emotional expression, resulting in unaddressed trauma. Youth and elders possess distinct vulnerabilities and knowledge resources that require recognition within inclusive frameworks. An intersectional approach enhances effectiveness by aligning interventions with diverse experiences and capacities within communities.

Policy and Governance Implications

Integrating IKS into disaster risk governance requires structural transformation across institutional and policy domains. Formal recognition of IKS within national disaster frameworks is essential for sustainable implementation. Dedicated funding mechanisms must support community-led initiatives and knowledge preservation (Motsumi. & Nemakonde, 2024). Legal protections are necessary to safeguard intellectual property and cultural rights. Capacity-building initiatives should target both institutional actors and community leadership to enable culturally responsive governance. Educational integration

#10 South Africa

Promoting Inclusive African Indigenous Knowledge Systems-Based Disaster Trauma Risk Reduction Management for Sustainable Futures

can support long-term sustainability by embedding Indigenous disaster knowledge within professional training and academic curricula.

Indigenous Knowledge Systems, Climate Justice, and Global Health. The marginalization of IKS reflects broader patterns of epistemic inequality within global governance structures. Recognizing and supporting these systems contributes to climate justice by valuing knowledge generated by communities disproportionately affected by environmental change. IKS-based disaster frameworks also enhance global health by addressing psychosocial and cultural dimensions of recovery that are frequently overlooked in conventional approaches. Cultural safety, com-

munity agency, and collective healing strengthen long-term resilience and social stability. Inclusive AIKS-based Disaster Trauma Risk Reduction Management represents a transformative paradigm for sustainable futures. By reconceptualizing resilience as cultural continuity, trauma recovery as collective restoration, and knowledge production as pluralistic, the framework offers a comprehensive model for disaster governance. Integrating IKS into disaster policy and practice enhances effectiveness, equity, and sustainability. As climate-related disasters intensify, the recognition of indigenous epistemologies is not an alternative option but a fundamental requirement for just and resilient global futures. —

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11 South Africa

African Youth Digitalizing Traditional Healthcare Systems for global Epistemic Justice: Prospects and Challenges in Southern Africa

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ABSTRACT. This research article examines the transformative potential of African youth in digitalizing traditional mental healthcare systems within Southern Africa. Confronting a significant treatment gap, where approximately 75% to 85% of people with mental disorders in low-and-middle-income countries receive no treatment, this study explores the integration of African Indigenous Knowledge Systems (AIKS) with digital platforms. Utilizing a comparative mixed-methods framework, the paper analyses how youth-led innovations promote global epistemic justice by validating African indigenous healing paradigms against Western biomedical hegemony. The findings reveal that while digital tools enhance accessibility and documentation, significant hurdles remain, including the digital divide, data privacy concerns, and the risk of cultural misappropriation. The study concludes with strategic recommendations for policy integration and capacity building to ensure a sustainable and decolonized mental health ecosystem.

KEYWORDS. African Youth, Digital Mental Health, Indigenous Knowledge Systems, Epistemic Justice, Southern Africa, Traditional Healing.

INTRODUCTION. The global mental health landscape is currently characterized by a profound epistemic inequality, where Western psychiatric frameworks dominate diagnostic and therapeutic standards, often marginalizing non-Western epistemologies (Joseph, 2025). In Southern Africa, African youth are emerging as pivotal agents of change, leveraging digital technologies to bridge the treatment gap by integrating traditional healing practices with modern e-health solutions (Okunade et al., 2023). This paper argues that the digitalization of traditional mental healthcare is not merely a technical endeavour but a proactive pursuit of global epistemic justice. By validating diverse healing paradigms, youth-led initiatives challenge digital neo-colonialism and foster a clinic of Otherness that respects local sociocultural nuances (Tomičić & Gjorgjioska, 2024).

BACKGROUND AND RATIONALE. Traditional mental healthcare in Africa is inherently holistic, addressing spiritual, communal, and physical well-being rather than focusing solely on individual pathology (Zou, 2025). In South Africa, for instance, there are approximately 200,000 traditional healers compared to only about 1,000 psychiatrists, making healers the primary point of con-

tact for the majority of the population. Despite their cultural legitimacy, these systems have been historically marginalized by colonial-era biomedical models (Ndasauka, 2023). The rationale for this study lies in the urgent need to integrate these deeply rooted systems with digital innovations to overcome treatment gaps and ensure that mental health services are culturally congruent and accessible (Forane et al., 2025).

PROBLEM STATEMENT. The persistent treatment gap in Southern Africa is exacerbated by a shortage of Western-trained professionals and a lack of culturally responsive assessment tools. Western diagnostic manuals, such as the DSM-5, often fail to capture culturally specific idioms of distress, leading to misdiagnosis (Bantjes, 2023). Furthermore, the rapid digitalization of health risks perpetuating digital colonialism, where Global North-centric designs overlook local knowledge systems. There is a critical need to investigate how African youth can scale indigenous mental health frameworks digitally without succumbing to epistemic distortion or extractive appropriation (Joseph, 2025).

RESEARCH QUESTIONS

- How are African youth utilizing digital platforms to adapt and disseminate traditional mental healthcare practices in Southern Africa?
- To what extent do these youth-led

initiatives contribute to global epistemic justice and the decolonization of mental health narratives?

- What are the primary technical, ethical, and socio-economic challenges impeding the integration of traditional healing with digital technology?

SPECIFIC OBJECTIVES

- To investigate the role of African youth as innovators in the digital mental health landscape.
- To analyse the effectiveness of integrating Ubuntu-based philosophies into AI-driven mental health support.
- To identify policy and regulatory gaps that hinder the sustainable scaling of traditional e-mental health.
- To propose a framework for co-produced research and capacity building in Indigenous Knowledge Systems (IKS).

SIGNIFICANCE OF THE RESEARCH STUDY.

This study provides a critical lens on the intersection of youth, technology, and AIKS. It signifies a shift from reactive adaptation to autonomous digital paradigms co-produced by communities (Joseph, 2025). By centering African indigenous voices, the research contributes to a more inclusive global discourse on mental well-being and offers practical insights for disaster risk reduction and community resilience (Kirmayer & Pedersen, 2014).

LITERATURE REVIEW. The literature highlights a growing recognition of

#11 South Africa

African youth digitalizing traditional mental health-care systems for global epistemic justice: prospects and challenges in Southern Africa

medical pluralism, where traditional and biomedical approaches complement each other (Green & Colucci, 2020). Digital wellness tools, particularly those leveraging Large Language Models (LLMs), offer a unique opportunity to provide personalized, culturally sensitive support based on African natural products and traditional wisdom (Zou, 2025). However, scholarship also warns of the digital divide, noting that while mobile penetration is high, data costs remain a barrier for up to 60% of rural populations in Southern Africa. Decolonizing these narratives requires moving beyond mere usability metrics to consider embodied, symbolic, and communal pathways to care (Joseph, 2025).

CONCEPTUAL AND THEORETICAL FRAMEWORK. This research is guided by the Decoloniality Framework and Ubuntu Philosophy. Ubuntu emphasizes interconnectedness and communal well-being, contrasting with the individualized focus of Western psychology (Gwagwa et al., 2022). The study also employed Critical Race Theory (CRT) to analyse how power dynamics influence the production of health knowledge (Mugwaze, 2025). These frameworks allowed for an examination of situated knowledge generation, ensuring that digital tools are epistemologically congruent with the cultural semiotics of Southern African communities.

METHODOLOGICAL FRAMEWORK: SOUTHERN AFRICAN CASE STUDIES.

The methodological framework utilized a mixed-methods comparative design grounded in Indigenous-Based Methodologies (IBM) and Human-Centered Design (HCD). This approach ensured that digital tools are not merely technically functional but culturally congruent and epistemologically just (Triplett et al., 2020; Wali et al., 2025).

Sampling and Case Selection: Using purposive, maximum variation sampling, the study focused on three distinct youth-led Southern African cases (Daniel et al., 2021):

- The KwaZulu-Natal Province Case (South Africa): Investigating the Kuumsha app's integration of Zulu healing philosophies in rural Durban (Dallison et al., 2025).
- The Zimbabwe Case: Analysing the digitalization of the Friendship Bench through the Inuka platform for urban peer support (Dambi et al., 2022).
- The Northern Namibia Case: Exploring technological co-exploration with San communities to preserve oral healing traditions via mobile tools (Rodil et al., 2020).

Data Collection and Analysis: Data collection integrated ethnographic shadowing and Focus Group Discussions (FGDs) with quantitative surveys to measure adoption and symptom reduction (Lund et al., 2012). Qualitative data were synthesized via Thematic Framework Analysis using Dedoose,

focusing on intersubjective trust and symbolic alignment (Engell et al., 2024). Ethical oversight adhered to the Protection of Personal Information Act (POPIA), prioritizing Indigenous Intellectual Property (IIP) and data sovereignty (Botes, 2025).

RESULTS AND DISCUSSIONS. The study found that African youth were successfully creating hybrid models that blend digital accessibility with face-to-face traditional consultation. For example, youth-led apps in South Africa have shown a 40% increase in help-seeking behaviours among young men, a group historically resistant to Western clinical care due to stigma. **Prospects for Epistemic Justice:** Digital platforms allow for the archiving of spiritual rituals and herbal remedies, ensuring their preservation against attrition. By using culturally specific idioms, these tools reshape help-seeking attitudes and foster cognitive democracy (Tomičić & Gjorgjioska, 2024). **Challenges and Barriers:** The digital divide remains significant; statistics show that while 95% of South African youth have mobile access, only 40% have consistent access to high-speed data. Furthermore, AI-driven chatbots often exhibit demographic biases, producing responses that lack the nuanced empathy found in traditional communal healing (Badawi et al., 2025).

CONCLUSION AND STRATEGIC RECOMMENDATIONS. The digitalization of traditional mental healthcare represents a transformative pathway toward epistemic equity. African youth are effectively bridging the gap between ancestral knowledge and frontier technology, positioning technology as a tool for collective well-being rather than individualistic profit.

Strategic Recommendations:

- **Policy Integration:** National health strategies should officially recognize and integrate traditional digital mental health initiatives, providing legislative support for data-free health platforms (Okunade et al., 2023).
- **Capacity Building:** Invest in training for both traditional healers and data scientists to ensure AI models are trained on diverse, locally sourced datasets (Olufadewa et al., 2025).
- **Governance:** Establish robust regulatory frameworks for data sovereignty to protect IKS from extractive exploitation.
- **Interdisciplinary Research:** Future studies should focus on the long-term clinical efficacy of hybrid traditional-digital interventions using indigenous-based methodologies (Wali et al., 2025). —

#11 South Africa

African youth digitalizing traditional mental health-care systems for global epistemic justice: prospects and challenges in Southern Africa

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African solutions by African researchers to strengthen African health systems

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- Mathematical Modeling in Public Health

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- Training and Research in BME
- Health Technology Management (HTM)
- Health Technology Assessment (HTA)
- Medical Device Research and Innovation
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12 Ukraine

Modern Aspects of Trauma Causes and Prevention Strategies

Hanna Saturska, Mohit Kharb

ABSTRACT. Introduction. In recent decades, trauma has emerged as a major global public health issue. While infectious diseases once dominated global health priorities, injuries and trauma have increasingly become important causes of death and disability. According to global health reports, millions of people suffer from traumatic injuries every year. Many of these injuries lead to long term disability, affecting not only individuals but also families and communities. The economic impact of trauma is also substantial, as it increases healthcare costs and reduces productivity. One reason trauma has gained attention in public health research is its preventable nature. Many injuries occur due to modifiable factors such as unsafe roads, lack of protective equipment, poor workplace safety, or alcohol use. By addressing these factors, it is possible to significantly reduce injury rates.

This study aims to investigate the causes of trauma and to review existing trauma prevention strategies from a public health perspective.

Materials and methods. This study used a descriptive research design based mainly on secondary data. Information was collected from global health organization reports, research articles, and trauma registry studies. The study also reviewed public health programs aimed at improving early detection and prevention.

Results. The results indicate that road traffic injuries, falls, burns, and interpersonal violence were found to be the most common causes of trauma. A range of prevention strategies have been identified as the main strategic directions for trauma prevention among the population. These include road safety programmes, public awareness campaigns, and workplace safety strategies to prevent occupational injuries.

Conclusion. Trauma is a major public health concern that requires both medical and preventive interventions. Strengthening emergency care systems, improving early detection, and implementing community-based prevention strategies can help reduce trauma-related deaths and disabilities. Public health policies should continue to focus on injury prevention and improved trauma care infrastructure.

Keywords. trauma, causes of trauma, trauma care systems, prevention strategies, public health policies.

INTRODUCTION. Severe or major trauma represents a global pandemic and remains one of the primary causes of death and disability worldwide^[7]. However, its distribution varies across global, national, and local levels. Trauma is highly heterogeneous with respect to its causes, types of injuries, and the severity of those injuries, and it is often associated with significant uncertainty

regarding prognosis^[1,7]. The risk factors for trauma are closely linked to human behaviour as well as sociosanitary, occupational^[12], economic, political, and cultural influences^[1,7]. Likewise, its management requires the involvement of numerous healthcare structures, organizations, and clinical and surgical specialties. Reducing the burden of trauma is therefore a complex challenge that demands a multidisciplinary approach and sustained efforts to prevent it from continuing to be regarded as an “unattended epidemic.” Therefore, the study objectives were to investigate the causes of trauma and to review existing trauma prevention strategies from a public health perspective.

METHODOLOGY. This research used a descriptive and analytical approach. The study employed the publicly available data sources.

RESULTS AND DISCUSSION. Major Causes of Trauma. Several types of injuries contribute to trauma statistics worldwide. These include both intentional and unintentional injuries^[1, 2, 7, 9]. Common causes include:

- Road traffic accidents
- Falls
- Burns
- Drowning
- Workplace injuries
- Interpersonal violence

Among these, road traffic accidents are considered one of the most serious problems^[4]. Rapid urbanization and increasing vehicle use have contributed to the rise in traffic-related injuries. Falls are another major cause of trauma, especially among older adults^[2, 5]. Age-related changes such as reduced balance and muscle strength increase the risk of falls^[3, 11]. Burn injuries are more common in certain regions where

Cause	Risk Group	Typical Outcome
Road traffic accidents	Young adults	Head injuries, fractures
Falls	Elderly	Hip fractures
Burns	Women and children	Skin damage, disability
Violence	Youth	Severe trauma
Workplace accidents	Adult workers	Multiple injuries

Table 1. Major Causes of Trauma

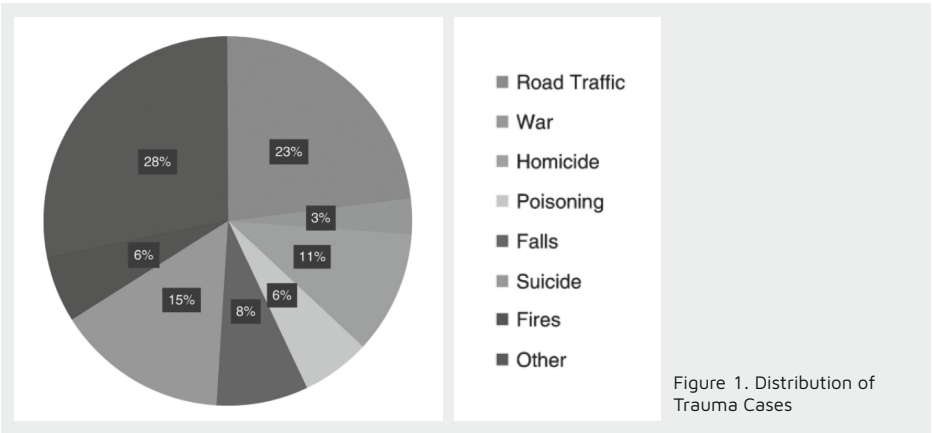
12 Ukraine
Modern Aspects of Trauma Causes and Prevention
Strategies

cooking and heating practices involve open flames or unsafe equipment. Socioeconomic conditions play a role in injury risk. Poor housing, unsafe workplaces [12], and lack of access to safety equipment can increase exposure to hazards. In many developing regions, trauma care systems are also limited. Delayed treatment and inadequate facilities can worsen outcomes for injured patients.

Distribution of Trauma Cases. Analysis of available data shows that trauma cases are distributed unevenly across different causes.

- Road Traffic. Road traffic injuries are the second leading cause of trauma deaths globally, accounting for nearly a quarter of all injury-related mortality. This highlights the critical public health challenge posed by traffic accidents worldwide.

- Suicide. Suicide constitutes a substantial share of trauma deaths, reflecting the global burden of intentional self-harm as a leading cause of premature mortality.
- Homicide. Deaths due to interpersonal violence (homicide) also contribute a significant portion of trauma mortality, emphasizing ongoing challenges in violence prevention and control.
- Falls. Falls represent a notable cause of trauma deaths, often affecting elderly populations and contributing to morbidity and mortality, especially in aging societies.
- Fires and Poisoning. Both are smaller but still important contributors to trauma mortality, highlighting risks from environmental hazards and toxic exposures.
- War. Deaths due to war and armed conflict are lower compared to other



causes but remain a significant trauma mortality factor in affected regions.

- Other causes. This is the largest category, encompassing a range of injury causes not specifically listed here. It indicates that a significant portion of trauma deaths come from diverse sources beyond the major named categories.

Prevention Strategies. Prevention is considered the most effective way to reduce trauma burden.

Road Safety Programs and Their Impact on Reducing Traffic Injuries. Road traffic injuries remain a leading cause of morbidity and mortality worldwide, responsible for over 1.3 million deaths annually and millions more non-fatal injuries that often result in long-term disability^[1, 9]. In response, various road safety programs and policies have been developed globally to mitigate the incidence and severity of traffic-related injuries. This section examines four critical components of road safety initiatives – helmet laws^[4], seatbelt enforcement, speed limits, and public awareness campaigns^[8, 10] – and presents evidence of their effectiveness in reducing road traffic injuries and fatalities.

Helmet Laws. Helmets are a proven protective measure for motorcyclists and bicyclists, who constitute a vulnerable group on the roads^[4]. Numerous

studies have demonstrated that helmet use substantially reduces the risk of head injuries and fatalities following crashes. According to the World Health Organization (WHO), wearing a helmet reduces the risk of death by 42% and the risk of severe head injury by up to 69%. Countries that have enacted mandatory helmet laws show markedly higher compliance rates and lower rates of traumatic brain injuries compared to regions without such legislation. The enforcement of helmet laws involves both legal mandates and police monitoring. Successful implementation often requires accompanying public education to increase awareness of helmet benefits and availability of affordable helmets. Moreover, helmet standards must be regulated to ensure that helmets provide adequate protection. In regions with comprehensive helmet laws and enforcement, reductions in motorcycle-related fatalities of 20% to 40% have been documented. However, challenges such as cultural resistance, cost barriers, and inconsistent enforcement can limit effectiveness.

Seatbelt Enforcement. Seatbelts are another cornerstone of occupant safety in vehicles. Wearing a seatbelt reduces the risk of death among front-seat passengers by approximately 45% and the risk of serious injury by 50%. Enforcement of seatbelt use through legislation and penalties has been pivotal in increasing compliance. Primary

#12 Ukraine

Modern Aspects of Trauma Causes and Prevention Strategies

enforcement laws, which allow police officers to stop and ticket drivers solely for not wearing seatbelts, are more effective than secondary enforcement laws that only permit seatbelt citations if a driver is pulled over for another offense.

Empirical evidence from countries with strong seatbelt enforcement demonstrates significant declines in road traffic fatalities and hospital admissions. For example, the introduction of mandatory seatbelt laws in high-income countries has been associated with a 30% to 50% reduction in fatalities among vehicle occupants. Complementing enforcement with targeted education campaigns increases public acceptance and habitual use of seatbelts.

Speed Limits. Excessive speed is a major contributor to the occurrence and severity of road traffic crashes. Higher vehicle speeds increase both the likelihood of collisions and the force of impact, which exacerbates injury severity. Implementation and enforcement of speed limits, particularly in high-risk zones such as urban areas and near schools, are critical to reducing traffic injuries. Evidence indicates that a 5% reduction in average speed can lead to a 30% reduction in fatal crashes.

Speed management strategies include setting appropriate speed limits based on road type and environment, installing speed cameras, and conducting speed enforcement campaigns. Studies

reveal that automated speed enforcement systems lead to consistent reductions in speed-related crashes and fatalities. However, public compliance depends on perceived enforcement likelihood and acceptance of speed limits. Thus, speed control programs must be accompanied by public education and community engagement to achieve sustainable behaviour change.

Public Awareness Campaigns. Public awareness and education campaigns are essential for promoting safer behaviours among all road users^[8, 10]. These campaigns utilize various media, such as television, radio, social media, and community events, to communicate risks, encourage protective behaviours, and raise awareness of traffic laws. For example, campaigns promoting helmet use, seatbelt wearing, and sober driving have contributed to changes in attitudes and practices, enhancing the effectiveness of legislative measures.

Successful campaigns are often theory-based, culturally tailored, and supported by multisectoral partnerships involving government agencies, non-governmental organizations, and community groups. The use of vivid storytelling, real-life testimonials, and targeted messaging for high-risk populations (e.g., young drivers, motorcyclists) increases campaign impact. Evaluations of public awareness initiatives indicate improvements in knowledge, attitudes, and

compliance with road safety practices, which translate into reductions in injuries and fatalities over time.

Road safety programs encompassing helmet laws, seatbelt enforcement, speed limits, and public awareness campaigns have been empirically validated as effective strategies to reduce road traffic injuries and fatalities globally. Legislative measures, when coupled with rigorous enforcement and public education, create safer road environments and promote protective behaviours among drivers, passengers, and vulnerable road users.

Nevertheless, the success of these interventions depends on context-specific factors including political commitment, resource allocation, cultural attitudes, and infrastructure quality. Challenges such as enforcement consistency, affordability of safety equipment, and sustaining public engagement require ongoing attention. Future efforts must integrate comprehensive approaches combining policy, enforcement, education, and community involvement to achieve substantial and sustained reductions in road traffic trauma worldwide.

Workplace Safety: Strategies to Prevent Occupational Injuries. Workplace injuries represent a significant global public health and economic burden, affecting millions of workers annually across diverse industries^[12]. According to the International Labour Orga-

nization (ILO), more than 2.3 million people worldwide die each year from work-related accidents and diseases, while hundreds of millions suffer non-fatal occupational injuries, many resulting in long-term disability. Preventing workplace injuries is paramount not only for protecting workers' health and wellbeing but also for maintaining productivity and reducing economic costs associated with absenteeism, compensation claims, and medical treatment. This section explores key strategies for workplace injury prevention: protective equipment, safety training, hazard identification, and the essential responsibility of employers in fostering safe working conditions.

Protective Equipment. Personal protective equipment (PPE) serves as the last line of defence against occupational hazards when engineering and administrative controls cannot completely eliminate risks. PPE includes items such as helmets, safety goggles, gloves, ear protection, respiratory masks, and high-visibility clothing. The appropriate selection and use of PPE depend on the specific hazards present in a workplace, including mechanical risks, chemical exposure, noise, and falling objects.

Extensive research confirms that consistent and correct use of PPE reduces the incidence of workplace injuries substantially. For example, helmets can prevent traumatic brain injuries in construction workers, respiratory

#12 Ukraine

Modern Aspects of Trauma Causes and Prevention Strategies

masks reduce inhalation of harmful substances in manufacturing, and ear-plugs prevent noise-induced hearing loss in noisy environments. However, PPE effectiveness is contingent upon proper fit, user training, maintenance, and enforcement of use policies. Employers must provide adequate PPE free of charge, ensure availability in sufficient quantities, and monitor compliance.

Safety Training. Safety training is critical for empowering workers with the knowledge and skills necessary to recognize hazards and apply safe work practices^[12]. Training programs cover a range of topics, including correct equipment handling, emergency procedures, use of PPE, ergonomics, and reporting unsafe conditions. Tailoring training content to the literacy levels, languages, and cultural contexts of employees enhances comprehension and engagement.

Effective training is interactive and ongoing, incorporating practical demonstrations, drills, and refresher courses. It fosters a safety culture by encouraging worker participation, hazard awareness, and adherence to protocols. Evidence shows that workplaces with comprehensive safety training programs report significantly lower rates of accidents and near misses. In addition to formal training sessions, regular toolbox talks and safety meetings sustain awareness and allow for continuous feedback and improvement.

Hazard Identification. Identifying workplace hazards proactively is foundational to preventing injuries. Hazard identification involves systematic processes such as workplace inspections, risk assessments, job safety analyses, and incident investigations. It aims to uncover physical, chemical, biological, ergonomic, and psychosocial risks that could lead to accidents or occupational illnesses.

Once hazards are identified, employers can prioritize them based on severity and likelihood, then implement appropriate control measures following the hierarchy of controls – elimination, substitution, engineering controls, administrative controls, and PPE. Engaging workers in hazard identification enhances detection accuracy and ownership of safety initiatives. Modern approaches incorporate technology such as digital reporting tools, wearable sensors, and data analytics to improve hazard tracking and response.

Employer Responsibility in Ensuring Safe Working Conditions. Employers bear the primary legal and ethical responsibility for providing safe and healthy work environments. This responsibility includes compliance with occupational health and safety regulations, risk management, and fostering a culture of safety. Employers must allocate resources for safety infrastructure, training, equipment, and health surveillance programs.

Effective safety management systems integrate policies, procedures, communication channels, and continuous monitoring to ensure compliance and improvement. Employers are also responsible for investigating incidents, implementing corrective actions, and engaging workers through safety committees and participation initiatives. Leadership commitment to safety is a key determinant of program success, influencing organizational attitudes and behaviours toward risk.

Failing to uphold safety standards not only jeopardizes workers' wellbeing but also exposes employers to legal liabilities, financial losses, and reputational damage. Therefore, proactive investment in workplace safety yields benefits for workers, employers, and society by reducing injury rates and associated costs.

Workplace safety is a multifaceted endeavour requiring the integration of protective equipment, comprehensive safety training, vigilant hazard identification, and dedicated employer commitment. These elements collectively form the cornerstone of injury prevention and occupational health promotion. Evidence consistently demonstrates that workplaces investing in these strategies experience lower injury rates, improved worker morale, and enhanced productivity.

Achieving safe working conditions demands ongoing collaboration between employers, employees, regulators, and

occupational health professionals. Future efforts should focus on strengthening safety cultures, leveraging technology for hazard management, and addressing emerging risks in evolving industries. Ultimately, protecting workers through effective safety programs is both a moral imperative and a strategic necessity for sustainable economic development.

Community Education: Promoting Injury Prevention through Awareness and Education. Community education plays a pivotal role in injury prevention by influencing knowledge, attitudes, and behaviours related to safety^[8, 10]. Through public awareness campaigns and structured educational programs, communities can reduce engagement in risky behaviours such as unsafe driving and excessive alcohol consumption, which are major contributors to trauma and injury. This section explores how community education initiatives effectively foster safer practices and build a culture of prevention at multiple levels of society.

Public Awareness Campaigns. Public awareness campaigns are strategic efforts designed to communicate key safety messages to broad audiences through diverse media channels, including television, radio, social media, billboards, and community events. These campaigns aim to increase public knowledge about injury risks and

#12 Ukraine

Modern Aspects of Trauma Causes and Prevention Strategies

promote behaviour change by raising awareness of specific hazards and preventive measures.

For example, campaigns targeting road safety emphasize the dangers of speeding, distracted driving, driving under the influence of alcohol or drugs, and the importance of seatbelt and helmet use. These messages are often reinforced with graphic visuals, testimonials from victims, and calls to action. Similarly, campaigns addressing alcohol consumption focus on the risks of binge drinking and impaired driving, encouraging safer choices.

Empirical evidence supports the effectiveness of well-designed campaigns in reducing risky behaviours and injury rates. Campaigns that are theory-based, culturally sensitive, and sustained over time tend to yield stronger and more lasting impacts. Moreover, coupling media campaigns with legislative enforcement and community engagement magnifies their influence. For instance, a combined approach of media messaging, sobriety checkpoints, and stricter DUI laws has led to significant reductions in alcohol-related traffic fatalities in many countries.

Educational Programs in Schools.

Schools serve as vital platforms for early injury prevention education, targeting children and adolescents during formative years when lifelong habits and attitudes are established. School-based programs incorporate injury pre-

vention into the curriculum, teaching students about traffic safety, pedestrian rules, safe use of playground equipment, water safety, and substance abuse prevention.

These programs use age-appropriate interactive methods such as role-playing, simulations, peer education, and group discussions to engage students actively. Evidence indicates that school injury prevention programs improve students' knowledge, attitudes, and self-reported safety behaviours. They also contribute to reductions in injury incidence by promoting safer choices both inside and outside school settings.

Integrating parents, teachers, and community members into these initiatives enhances their reach and effectiveness, creating a supportive environment for children to apply what they learn. Additionally, schools often collaborate with local health and safety agencies to deliver workshops and provide resources, further strengthening community ties.

Community-Based Educational Initiatives.

Beyond schools, community education initiatives engage broader populations including adults, seniors, and vulnerable groups through workshops, seminars, support groups, and outreach events. These programs address diverse injury risks such as falls among the elderly, domestic violence, workplace hazards, and recreational safety.

Community education fosters empower-

ment by increasing awareness of environmental hazards, promoting use of safety equipment, and encouraging adoption of safer lifestyle practices. It also serves to mobilize community resources and leaders, facilitating local ownership of injury prevention efforts. Successful initiatives often partner with public health departments, non-governmental organizations, and local governments to maximize impact.

Evaluation studies demonstrate that community education programs contribute to improved safety knowledge, behavioural changes, and reductions in injury-related hospitalizations and deaths. Tailoring programs to the cultural and socioeconomic context of target populations enhances accessibility and relevance.

Community education, through public awareness campaigns and educational programs in schools and local settings, is a cornerstone of comprehensive injury prevention strategies. These efforts effectively reduce risky behaviours such as unsafe driving and excessive alcohol consumption by increasing knowledge, shifting attitudes, and fostering safer practices.

The success of community education depends on culturally appropriate messaging, sustained engagement, multi-sectoral collaboration, and integration with policy and enforcement measures [8, 10]. By empowering individuals and communities with information and skills, these programs create

environments conducive to injury reduction and health promotion. Continued investment in and innovation of community education initiatives are essential for advancing global injury prevention goals and enhancing public safety.

CONCLUSIONS. The findings of this study highlight the ongoing importance of trauma as a public health issue. A multifaceted approach is essential to effectively reduce trauma-related mortality and morbidity worldwide. The following recommendations highlight key areas for policy action, healthcare system strengthening, public engagement, and research prioritization.

Governments play a pivotal role in shaping the landscape of injury prevention through legislation, resource allocation, and strategic planning. This study underscores the need for governments to intensify efforts in developing and implementing comprehensive injury prevention programs tailored to local epidemiological contexts.

Effective prevention requires the enforcement of traffic safety laws, such as helmet and seatbelt mandates, speed regulation, and impaired driving restrictions, alongside workplace safety regulations and environmental hazard controls. Governments should also invest in infrastructure improvements, including safer road designs, pedestrian walkways, and workplace ergonomics. Allocating adequate funding and es-

#12 Ukraine

Modern Aspects of Trauma Causes and Prevention Strategies

establishing intersectoral collaborations across health, transport, education, and law enforcement agencies can enhance program reach and efficacy. Moreover, periodic evaluation of injury prevention initiatives is necessary to

ensure their effectiveness and inform iterative improvements. Strengthened governmental commitment to injury prevention will substantially contribute to reducing trauma burden and improving population health outcomes. —

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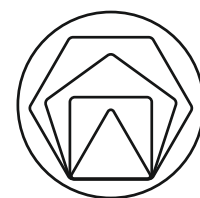
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13 Ukraine

Effect of the War in Ukraine on the Mental Health of Medical Students and the Anxiety Levels of Children

Nepelyak Sofiia, Kalchenia Yuliia

RELEVANCE. War and military conflicts are important predictors of anxiety disorders, as they are characterized by a high degree of trauma for both mental and physical health^[1, 2]. The psychological impact of war is complex and can be determined by a number of factors, including both direct trauma and other psychosocial stressors, the level, structure and duration of exposure, social support and socioeconomic status.

Anxiety is not a rare phenomenon in the modern world, and during the war, adults and children are not protected from this condition. An anxious child lives in a state of constant causeless fear and tension, especially those students who live and study in conditions of martial law. It is also necessary to take into account that many schoolchildren are internally displaced persons, some have relatives and acquaintances who are at the front, some of the children have already lost loved ones. All this can lead to anxious reflections that prevent not only learning, but also living a quality everyday life, so it is so important to diagnose anxiety in school-age children.

OBJECTIVES. To determine the prevalence of trauma, depression, anxiety and stress in medical students after 24 months of the war in Ukraine; to evaluate the levels of anxiety among primary, secondary and senior school

students after 20 months of the war in Ukraine.

RESEARCH METHODS. First stage of this study was cross-sectional and included the study of the mental health of students of the I.Ya. Horbachevsky Ternopil National Medical University. The statistical population included students of 2–5 years of the medical faculty and consisted of 776 students who completed the Depression, Anxiety and Stress Scale (DASS)-21^[3, 4] and 491 students of the same years on the Impact of Events Scale (IES-R)^[5, 6]. The reliability index (Cronbach's alpha) for the DASS-21 scale was = 0.92, and for the IES-R scale = 0.91.

The second stage of this study was cross-sectional too. This study was conducted among children of the Ternopil educational complex "Secondary School of I–III Degrees – Law Lyceum No. 2". The total number of study participants who were surveyed was 105 children. In particular, 32 of them were children aged 8–9, 35 were children aged 12–13, and 38 were children aged 15–17. In order to evaluate the level of anxiety in children, we used The State-Trait Anxiety Inventory. The STAI has 20 items for assessing trait anxiety and 20 for state anxiety^[7]. The state anxiety measurement assesses how the individual feels "right now" or at this moment. The trait anxiety measure-

ment estimates how the individuals generally feel by rating themselves on a four-point scale: almost never, sometimes, often, or almost always. The reliability index (Cronbach's alpha) for the STAI was = 0.85.

MAIN RESULTS. Among students, 62.5% showed signs of stress, 59.6% of anxiety, and 58.8% of depression. Severe and very severe levels of depression were found in 25.6% of people, anxiety in 31.9% of people, and stress in 29.7% of people. It was found that these symptoms are more common in women compared to men. The largest quantitative characteristics among the studied components were determined by stress indicators, which exceeded the level of anxiety by 1.61 times and the level of depression by 1.39 times. It was determined that 44.2% of all medical students have fairly high manifestations of post-traumatic stress disorder. The severity of post-traumatic stress disorder in female students is 1.58 times higher than in men.

Of the total number of primary school students, the proportion of children with a high level of state anxiety was 22%, with a moderate level – 72% and with a low level – 6%. At the same time, the proportion of primary school students with a high level of trait anxiety was 25%, while 75% had a moderate level of trait anxiety. A low level of trait anxiety wasn't found in any of the primary school students. Among

secondary school students, 29% had a high level of state anxiety, 69% were students with a moderate level and only 3% with a low level of state anxiety. At the same time, the share of secondary school students with a high level of trait anxiety was 43%, and with a moderate level – 57%. A low level of trait anxiety wasn't noted in any of the secondary school students. Of the total number of senior school students, 42% were found to have a high level of state anxiety, and 58% of school students had a moderate level of state anxiety. While the proportion of senior school students with a high level of trait anxiety was 55%, and with a moderate level – 45%. Low levels of both state and trait anxiety weren't found in any of the senior students.

CONCLUSIONS. The war in Ukraine has negatively affected mental health. High levels of anxiety, stress, and depression among students lead to the development of symptoms of post-traumatic stress disorder.

The results of the STAI indicate that the moderate level of state anxiety prevails among primary, secondary and senior school students, and this level was the highest among primary school students. Senior school students have a high level of trait anxiety, while primary and secondary school students have a moderate level of trait anxiety. —

13 Ukraine

Effect of the War in Ukraine on the Mental Health of Medical Students and the Anxiety Levels of Children

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14 Ukraine

The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime

Roman Danylkov, Hanna Saturska

ABSTRACT. Introduction. The ongoing war in Ukraine has caused catastrophic disruptions to medical infrastructure, mass population displacement, and severe environmental degradation. These extreme conditions demand the integration of the “Health in All Policies” (HiAP) concept and the “One Health” approach, highlighting the undeniable interconnectedness between human, animal, and environmental health.

Objective. To systematically determine the role, efficacy, and practical implementation of intersectoral collaboration models in Ukraine – specifically focusing on the “One Health” approach, mental health support, and non-communicable disease (NCD) prevention – at the current stage of public health system development, with a regional focus on the Ternopil Oblast.

Materials and Methods. A comprehensive analysis of available internet information resources, official websites of regional Centers for Disease Control and Prevention (specifically the Ternopil Regional Center), reports from the Ministry of Health (MoH) of Ukraine, and World Health Organization (WHO) open data spanning 2023–2025 was conducted. The study utilized bibliographic, information-analytical, statistical methods, and content analysis to evaluate current public health strategies.

Results. The structural transformation of Ukraine's public health system is an-

chored in the new Law of Ukraine “On the Public Health System” (2023), which legally mandates the “One Health” approach. Practical implementation is evidenced by the intersectoral training of 500 professionals by the FAO, WHO, WOAHA, and UNEP in 2024, focusing on Joint Risk Assessments for zoonotic threats. Furthermore, the war has severely exacerbated mental health issues, prompting the creation of the Intersectoral Coordination Council for Mental Health and the widespread implementation of the Mental Health Gap Action Programme (mhGAP) program across educational and primary care sectors. In the Ternopil region, intersectoral cooperation has been critical in continuous water and air quality monitoring, as well as in overcoming localized infectious outbreaks, such as measles, and integrating internally displaced persons into the regional healthcare network.

Conclusion. The effective prevention of diseases and the protection of the population in Ukraine are impossible without robust intersectoral collaboration. Active partnerships between healthcare providers, veterinary services, educational institutions, environmental agencies, and international organizations constitute the only viable mechanism for creating a resilient public health system capable of responding to wartime and post-war epidemiological, ecological, and psychosocial threats.

KEYWORDS public health centers, intersectoral collaboration, One Health, Health in All Policies, disease control, mental health, non-communicable diseases.

INTRODUCTION. The modern landscape of global health is characterized by highly complex, multifaceted challenges that transcend traditional medical boundaries. In Ukraine, the evolution of the public health system has undergone a monumental shift from the outdated, highly centralized, and reactive Semashko model to a decentralized, proactive, and preventive European framework ^[1]. However, this vital systemic transition has coincided with the most devastating humanitarian and security crisis in Europe since the Second World War. The full-scale invasion of Ukraine by the Russian Federation, which began in February 2022, has inflicted profound, systemic damage upon the nation's critical infrastructure, economy, and healthcare networks ^[2]. Numerous attacks on healthcare facilities across Ukraine resulted in severe limitations to medical access, especially in frontline and heavily affected regions ^[2]. The demographic shock has been equally catastrophic. Millions of Ukrainians have been forced to flee their homes; current estimates indicate the presence of approximately 3.7 million internally displaced persons (IDPs) within Ukraine and over 6.2 million refugees seeking safety abroad ^[3]. This

mass migration has not only disrupted the continuity of care for chronic patients, but has also drastically altered the epidemiological profiles of host regions, such as the Ternopil Oblast geographically located in western Ukraine. In such extreme conditions, the traditional approach to healthcare delivery cannot be sufficient, therefore the concept of “Health in All Policies” (HiAP) has emerged as a critical imperative. The HiAP framework operates on the foundational understanding that the primary determinants of health – such as environmental safety, socioeconomic stability, education, housing, and nutrition – lie outside the direct jurisdiction of the Ministry of Health. Consequently, mitigating the health impacts of the war requires a synchronized, whole-of-government and whole-of-society response.

A central pillar of this intersectoral synergy is the “One Health” approach. The Quadripartite alliance – comprising the Food and Agriculture Organization (FAO), the WHO, the World Organization for Animal Health (WOAH), and the United Nations Environment Programme (UNEP) – defines One Health as an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems ^[4]. In a war-torn country where ecological disasters (such as the destruction of dams and targeting of industrial sites) intersect with the collapse of veterinary controls and human

#14 Ukraine

The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime

displacement, the threat of zoonotic diseases, waterborne pathogens, and antimicrobial resistance (AMR) is exponentially amplified^[4].

Therefore, it is critically important to scientifically evaluate how intersectoral collaboration is being operationalized in Ukraine under martial law. By examining legislative reforms, national training initiatives, and regional case studies from the Ternopil Regional Center for Disease Control and Prevention, this study seeks to underscore the indispensable nature of interdisciplinary synergy in preserving public health and human capital.

Our objective was to determine the role, efficacy, and practical implementation of intersectoral collaboration models in Ukraine with a specific focus on the "One Health" approach, the integration of mental health support systems, and the management of non-communicable diseases (NCDs). The study aims to evaluate these mechanisms at the current stage of public health system development utilizing national data and regional statistics from the Ternopil Oblast of Ukraine.

MATERIALS AND METHODS. To achieve the research objectives, a comprehensive, multi-level analysis of available public health data and legislative frameworks was conducted. The study utilized a mixed-methods approach, heavily relying on bibliographic, information-analytical, statistical methods, and qualitative content analysis.

The primary sources of information included official regulatory documents, specifically the new Law of Ukraine "On the Public Health System" (№ 2573-IX), adopted on September 6, 2022, and put into effect on October 1, 2023, which establishes the legal, organizational, and economic foundation for a modern public health system in Ukraine^[5], and the overarching "Strategy for the Development of the Healthcare System until 2030"^[6]. Epidemiological and statistical data were extracted from the open dashboards and annual reports of the Ministry of Health of Ukraine^[7], the Public Health Center (PHC) of the MoH of Ukraine, and the National Health Service of Ukraine (NHSU)^[8].

To provide a localized context, the study deeply analyzed the Regional Public Health Profiles, specifically the comprehensive 2023-2024 profiles for the Ternopil Oblast published by the PHC^[9]. Furthermore, daily and weekly monitoring reports from the official website of the State Institution "Ternopil Regional Center for Disease Control and Prevention of the MoH of Ukraine" were examined to assess real-time intersectoral responses to environmental and epidemiological threats^[10]. Global context and humanitarian health indicators were sourced from the WHO's Health Resources and Services Availability Monitoring System (HeRAMS) reports^[11], the WHO Country Office in Ukraine Mid-Term Results Report 2024-2025^[12], and joint assessments

conducted by the World Bank, UNDP, and UNICEF^[13].

The inclusion criteria focused on data published between 2020 and 2025, ensuring maximum relevance to the wartime conditions. Purely military medical statistics were excluded due to classification restrictions, restricting the analysis strictly to civilian public health metrics.

RESULTS AND DISCUSSION. Legislative and Structural Transformations: The Foundation of Intersectoral Collaboration

The legal and administrative architecture of Ukraine's public health system has undergone a radical transformation designed to institutionalize intersectoral collaboration. The cornerstone of this transformation is the Law of Ukraine "On the Public Health System" (№ 2573-IX), which was adopted on September 6, 2022, and put into effect on October 1, 2023. The Law was fully enacted on January 1, 2025 and established the legal, organizational, and economic foundation for a modern public health system in Ukraine^[5]. This historic legislation officially buries the antiquated sanitary-epidemiological paradigms of the Soviet era and legally mandates the prevention of infectious and non-communicable diseases based on the comprehensive "One Health" approach^[5].

Article 5 of the Law explicitly recognizes the protection of the population

from diseases as a high-priority direction for all state bodies and local self-governments, essentially writing the "Health in All Policies" principle into national law^[5]. This legal framework mandates that ecological, agricultural, and educational sectors align their operations with public health objectives. The structural embodiment of this Law is the newly established network of 23 regional Centers for Disease Control and Prevention (CDCPs)^[11] including the CDCPs in Ternopil region. These centers, including the Ternopil Regional CDCP, serve as the primary operational centers for epidemiological surveillance, biosafety, and inter-agency coordination at the regional level.

Concurrently, the management of medical infrastructure has been optimized through the creation of a "capable hospital network." As of 2024, this network comprises 562 healthcare facilities across 19 regions, stratified into above-cluster, cluster, and general hospitals based on their capacity to serve specific population sizes (e.g., cluster hospitals serving 150,000–300,000 patients)^[14]. This restructuring has been crucial for resource management during the war. According to joint WHO and World Bank reports, the centralized pooling of funds through the National Health Service of Ukraine (NHSU) and the preservation of the Program of Medical Guarantees (PMG) have been paramount in ensuring financial protection for citizens^[13]. In 2025, the state budget all-

14 Ukraine

The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime

located 210.7 billion UAH to healthcare – a nominal increase aimed at countering a projected 7.9 % inflation rate^[15]. This centralized financial strategy protects hospitals in war-torn regions that have lost their local tax revenue bases, demonstrating successful macro-level governance^[13].

Operationalizing the “One Health” Approach in Wartime

While legislative frameworks provide the mandate, the practical implementation of the One Health approach requires extensive capacity building and daily operational coordination between disparate sectors. A seminal example of this occurred in 2024, when an unprecedented intersectoral training initiative was launched in Ukraine^[4].

Approximately 500 professionals representing Ukraine's animal health, public health, food safety, and wildlife management sectors participated in a comprehensive online One Health training course^[4]. Developed by the FAO and organized by the Quadripartite alliance (FAO, WHO, WOA, UNEP), the curriculum was specifically adapted into Ukrainian^[4]. The core focus of this initiative was to overcome traditional departmental silos and foster shared methodologies. A critical component was the simulation of an avian influenza outbreak, where participants practiced executing Joint Risk Assessments (JRA)^[4]. This exercise demonstrated how veterinarians, medical doctors, ecologists, and policymakers must col-

laborate seamlessly to manage risk, allocate resources, and communicate threats to the public effectively. Such capacity building is vital, as zoonotic diseases and antimicrobial resistance (AMR) do not respect bureaucratic boundaries^[4].

At the regional level, the Ternopil Regional Center for Disease Control and Prevention exemplifies the continuous application of One Health and environmental monitoring principles. In the context of the war, the threat of man-made environmental disasters – such as chemical spills from targeted industrial sites or radiation leaks – has become a daily reality. The Ternopil CDCP conducts transparent, daily monitoring of the radiation background (publishing results at 09:00 AM) and assesses broader Chemical, Biological, Radiological, and Nuclear (CBRN) threats^[10].

Furthermore, water quality, a fundamental determinant of health that spans ecological and medical domains, is rigorously monitored through inter-agency cooperation. In 2024, the Regional Office of Water Resources in the Ternopil region, in collaboration with public health laboratories, executed extensive testing of the Dniester river basin, including the Seret and Zbruch rivers. Data up to September 2024 indicates that out of 449 microbiological water samples tested, 22 (4.9%) failed to meet safety standards, and out of 1,617 sanitary-chemical tests, 85 (5.3%) were non-compliant^[16]. The

timely identification of these ecological anomalies allows public health officials to issue immediate warnings and coordinate with municipal water authorities to prevent widespread outbreaks of waterborne diseases, showcasing the tangible benefits of environmental-health sector synergy.

Air quality monitoring provides another stark example of intersectoral necessity. Academic studies analyzing the environmental impact of missile and drone attacks on Ukrainian cities have documented severe spikes in particulate matter (PM_{2.5}) due to explosions and resulting infrastructure fires^[17]. These concentrations have frequently exceeded the WHO daily threshold of 15 µg/m³, posing acute respiratory and cardiovascular hazards^[17]. Addressing these toxic exposures requires coordination between the State Emergency Service (DSNS), environmental inspectorates, and the healthcare system to manage the acute public health fallout. **Mental Health and Psychosocial Support (MHPSS): A Paradigm of Cross-Sectoral Integration**

Perhaps the most universally felt health consequence of the ongoing military conflict is the profound psychological traumatization of the Ukrainian population. The sustained exposure to violence, displacement, loss of loved ones, and chronic uncertainty has triggered a nationwide mental health crisis. WHO surveys indicate that a staggering 59% of primary healthcare (PHC) providers have

reported a significant surge in patients presenting with mental health conditions^[18]. Furthermore, internal migration has led to acute social isolation and distress; in the Ternopil region, integrating thousands of IDPs has strained local psychological and social services.

Recognizing that the psychiatric medical establishment alone could not absorb this monumental burden, the Ukrainian government initiated a massive intersectoral response. In May 2022, the Cabinet of Ministers approved the establishment of the Intersectoral Coordination Council for Mental Health^[19]. This marked a historic shift, moving mental health from the exclusive domain of isolated psychiatric hospitals into the broader societal sphere, involving the Ministry of Social Policy, the Ministry of Education and Science (MoES), and civil society organizations.

A cornerstone of this strategy has been the nationwide scaling of the WHO's Mental Health Gap Action Programme (mhGAP)^[20]. Originally designed to bridge the treatment gap in low- and middle-income countries, mhGAP equips non-specialist healthcare providers (such as family doctors and nurses) with the skills to identify and manage common mental, neurological, and substance use disorders^[20]. Through a robust partnership between the MoH, MoES, and WHO, the mhGAP curriculum has been integrated into undergraduate and postgraduate medical education across Ukraine.

14 Ukraine

The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime

The results of this collaborative policy are substantial. In 2025 alone, over 260,000 Ukrainians received psychosocial support at the primary care level, effectively decentralizing and destigmatizing mental healthcare. Furthermore, 136 medical facilities provided specialized inpatient psychiatric care, serving nearly 192,000 patients^[21]. Crucially, the implementation of mhGAP has expanded beyond clinics. Educational institutions, such as the I. Horbachevsky Ternopil National Medical University, have established dedicated Mental Health Centers. These centers serve a dual purpose: providing psychological first aid to students and staff affected by the war and acting as training hubs for the broader community. The recent visit by government officials to the TNMU Mental Health Center underscores the strategic importance of universities in the national psychological resilience framework^[22]. Moreover, international research demonstrates the efficacy of training community volunteers and educators in mhGAP protocols, empowering community leaders to provide empathy, care, and mental health education, thereby dismantling cultural stigmas. This multi-layered, multi-actor approach is the epitome of successful intersectoral collaboration in crisis management. Intersectoral Management of Non-Communicable Diseases (NCDs) and **Demographic Challenges**

While infectious diseases and war

trauma dominate headlines, non-communicable diseases (NCDs) remain the silent, overwhelming driver of mortality in Ukraine. According to the Global Burden of Disease study, in 2021, NCDs accounted for 72.8% of all disability-adjusted life years (DALYs) lost in Ukraine, effectively robbing the population of over 16.4 million years of healthy life. The primary culprits are cardiovascular diseases (CVDs) (46.4%), neoplasms/cancer (13.6%), and mental disorders^[23].

The demographic reality is equally grim. Official statistics reveal that in 2024, mortality in Ukraine exceeded the birth rate by nearly three times, with 495,100 deaths compared to only 176,100 births^[24]. In the Ternopil Oblast specifically, the natural population growth turned negative, reflecting national trends exacerbated by wartime stress and the outmigration of women of childbearing age. Furthermore, within the Ternopil region, cardiovascular diseases consistently rank as the absolute leading cause of mortality, aligning with the national epidemiological profile.

Addressing the NCD epidemic cannot be achieved through clinical interventions alone; it demands aggressive, intersectoral public health policies aimed at modifying behavioral risk factors. The baseline for these interventions was established by the 2019 WHO STEPS survey in Ukraine, which revealed alarmingly high rates of risk

behaviors. For instance, over one-third of the adult population were tobacco smokers, featuring a massive gender disparity (50.3% of men versus 16.7% of women)^[25]. Other pervasive risks included excessive alcohol consumption, unhealthy diets high in sodium and trans fats, and physical inactivity.

To combat these determinants, the "Health in All Policies" approach requires collaborative action across ministries. For example, reducing cardiovascular mortality involves the Ministry of Finance imposing taxation on sugar-sweetened beverages and tobacco products, the Ministry of Education ensuring nutritional standards in school cafeterias, and urban planners creating safe, green spaces to promote physical activity^[26].

The National Plan on Noncommunicable Diseases to achieve the Sustainable Development Goals (SDGs) officially integrated HiAP, acknowledging that public health is intrinsically linked to socio-economic development, agriculture, and urban infrastructure.

During the war, NCD management has faced severe disruptions. A modelling study projecting NCD excess mortality in conflict zones demonstrated that disruptions to essential medications (such as insulin for Type 1 Diabetes or chemotherapy for oncology patients) and the stress-induced exacerbation of hypertension drastically increase the incidence of fatal ischemic events^[27]. Therefore, ensuring the uninterrupted supply chains of NCD medications

through the NHSU's "Affordable Medicines" reimbursement program represents a critical intersectoral victory in maintaining the chronic care continuum in Ukraine.

Overcoming Infectious Disease Threats and Vaccine Hesitancy through Community Engagement

The congregation of large numbers of IDPs in temporary shelters, combined with the disruption of routine immunization schedules, created a highly volatile epidemiological environment for infectious disease outbreaks during the initial phases of the war. Controlling these threats requires intense cooperation between public health authorities, municipal governments, educational institutions, and the media.

In the Ternopil Oblast, the Public Health Profile for 2023 indicates a highly dynamic infectious disease landscape. The region endured a massive wave of the COVID-19 pandemic, registering 169,285 confirmed cases, representing 3.04% of the national burden – a figure disproportionately higher than the region's 2.48% share of the national population^[9]. Furthermore, the operational monitoring data for the 2024/2025 epidemic season showed a 20% weekly increase in acute respiratory viral infections (ARVI), influenza, and COVID-19 nationwide, resulting in nearly 7,000 weekly hospitalizations, with children comprising a significant majority. While the Ternopil region successfully maintained zero incidence of devasta-

#14 Ukraine

The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime

ting vaccine-preventable diseases such as polio and diphtheria, it faced a severe challenge with measles. The incidence of measles in the Ternopil Oblast was recorded at 8.05 times the national average^[9]. Such localized outbreaks point to deep-seated issues of “immunity gaps” and vaccine hesitancy within specific communities.

Global WHO reports explicitly highlight that addressing vaccine hesitancy and ensuring the success of national immunization programs is impossible without robust intersectoral collaboration, capacity building, and community engagement. Public health centers must partner with educators, religious leaders, and local media to counteract misinformation and build trust in vaccines.

Practically, this has been realized in the Ternopil region through the deployment of “vaccination buses.” Coordinated by the Regional CDCP and local administrative bodies, these mobile medical teams travel to remote rural communities and IDP shelters to deliver routine immunizations and COVID-19 boosters directly to vulnerable populations^[10]. This logistical feat requires cooperation with the transport sector, local law enforcement for security, and community leaders for public mobilization, serving as a prime example of decentralized, collaborative public health action.

CONCLUSION. The catastrophic pressures exerted by the ongoing war on

Ukraine's society and infrastructure have unequivocally demonstrated that public health is not the sole responsibility of the medical sector. The survival, resilience, and future recovery of the Ukrainian population depend entirely on the successful implementation of intersectoral collaboration and the “Health in All Policies” paradigm.

The integration of the “One Health” approach, as legally mandated by the new Law on the Public Health System, has facilitated vital cross-agency training and coordinated responses to environmental, zoonotic, and epidemiological threats. Regional institutions, such as the Ternopil Regional Center for Disease Control and Prevention, play an indispensable role in operationalizing these national policies – from conducting rigorous water and air quality monitoring to organizing mobile vaccination campaigns and monitoring infectious outbreaks.

Furthermore, the national response to the mental health crisis, spearheaded by the Intersectoral Coordination Council and the widespread deployment of the mhGAP program, serves as a global blueprint for integrating psychological support across educational, social, and primary medical sectors. Simultaneously, combating the overwhelming burden of non-communicable diseases requires sustained inter-agency efforts in policy-making, taxation, and health promotion. For the continued development of the public health system, it is recommended

that regional authorities further institutionalize these collaborative networks. By fostering permanent communication channels between healthcare providers, ecological inspectorates, educational institutions, and international human-

itarian partners, Ukraine can build a highly adaptive, resilient public health architecture capable of mitigating the long-term consequences of the war and ensuring the health security of future generations. —

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14 Ukraine

The Role of Intersectoral Collaboration in the Implementation of the One Health Approach in Ukraine: Challenges and Perspectives during wartime

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**The climate crisis is also
a health crisis. We act
economically, socially
AND ecologically
and aim to achieve
NET ZERO by 2035
(Scope 1–3).**



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15 Ukraine

War's carbon footprint and the combined climate-health crisis in Ukraine

Olha Bukareva, Sofiia Omelianchuk,
Valentyna Fedorchuk-Moroz

ABSTRACT. This article examines the impact of the carbon footprint and climate change caused by the war on the health of Ukrainians. Significant attention is paid to analyzing the sources of emissions that contribute to the intensification of greenhouse gas emissions in wartime conditions. The article analyzes general trends in the impact of climate change on health risks for Ukrainians. It also highlights the combined impact of climate change and war on the health of our compatriots.

INTRODUCTION. The armed aggression of Russia against Ukraine, which has persisted for nearly four years, has caused a large-scale destabilization of the ecological balance, manifested in a significant intensification of greenhouse gas emissions. The volume of greenhouse gas emissions resulting from military operations, infrastructure destruction, fires, and other war-related factors has reached 311 million tonnes of CO₂ equivalent. This amount is comparable to the annual emissions of France or half of the annual emissions of Germany^[1]. Climate change in Ukraine is substantially anthropogenic in nature and constitutes part of the Anthropocene – the geological epoch during which human activity has acquired a dominant influence on the climate and the natural environment.

Numerous domestic and foreign researchers have actively investigated the impact of war on the deterioration of the environmental situation in the country. Notable contributors include Dukhnevych A.V., Karpinska N.V., Pysarenko T.V., Kvasha T.K., Musina L.A., Polukarov Y.O., Kachynska N.F., Polukarov O.I., Stehniy O., and others.

Dukhnevych A.V. and Karpinska N.V. examine the catastrophic consequences of military aggression for Ukraine's ecosystems, focusing on the issue of demilitarization waste accumulation and its toxic impact on soil and water resources^[2].

In their monograph, Pysarenko T.V., Kvasha T.K., and Musina L.A. conduct a comprehensive risk analysis, particularly regarding those factors that have exacerbated the country's climate situation due to combat-related carbon dioxide emissions. They evaluate the implications for the country's scientific and innovative potential and propose post-war recovery strategies through the lens of the Sustainable Development Goals^[3].

A quantitative assessment of additional greenhouse gas emissions caused by hostilities, fires, and future reconstruction was addressed in study^[4], which underscores their negative contribution to global climate change.

Polukarov Y.O., Kachynska N.F., and Polukarov O.I. analyze the scale of en-

vironmental damage resulting from the full-scale invasion, reviewing methodologies for assessing harm to the atmosphere, land, and other natural components^[5].

Stehniy O.^[6] substantiates a sociological model of the correlation between military activity and climate security, studying the impact of war on social resilience and global environmental processes.

RESEARCH OBJECTIVES. The purpose of this study was to investigate the impact of the carbon footprint and war-induced climate change on the health status of the Ukrainian population.

MATERIALS AND METHODS. The following research methods were employed in this study: data collection and synthesis, critical analysis and forecasting, analytical methods (statistical analysis), case studies (analysis of specific instances), and systems analysis (to formulate theoretical and applied generalizations).

RESULTS. The intensification of greenhouse gas emissions during the period of Russia's full-scale invasion of Ukraine is driven by the excessive combustion of fuel by military equipment, emissions from fires at industrial facilities and destroyed buildings, and the destruction of forests and other vegetation. Such damage to flora due to shelling reduces the natural capacity of eco-

systems to sequester carbon dioxide^[7]. The combustion of fossil fuels and their export by Russia, which serves as a source of war financing, is also an integral part of the global climate change problem. Furthermore, due to intensive hostilities across significant portions of Ukrainian territory, there has been a marked increase in the number of fires caused by shelling, aerial bombardment, and landmines. Arid conditions resulting from climate change create ideal precursors for combat-induced fires (e.g., forest fires) to rapidly escalate into large-scale, uncontrollable blazes, particularly in areas where firefighting operations are hindered by safety risks^[4].

Additionally, aviation during wartime significantly increases the carbon footprint due to the necessity of bypassing restricted zones, which extends flight routes and fuel consumption. Beyond changes in civil aviation, military operations – specifically the deployment of fighter jets and bombers – generate intensive carbon dioxide emissions, thereby contributing to global climate change and exacerbating the environmental situation.

Figure 1 illustrates the emission sources that contribute to the intensification of greenhouse gas emissions under wartime conditions^[8].

General trends regarding the impact of climate change on health risks for the Ukrainian population include:

15 Ukraine
War's carbon footprint and the combined
climate-health crisis in Ukraine

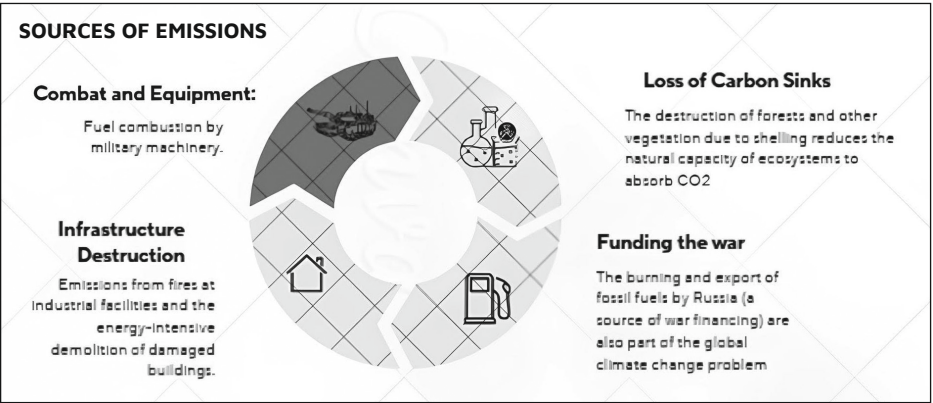


Fig. 1. Emission sources contributing to the intensification of greenhouse gas emissions under wartime conditions.

- An increase in heatstrokes and the exacerbation of chronic diseases (hypertension, angina pectoris, myocardial infarction risk) due to the rising number of abnormally hot days;
- The spread of emerging infectious diseases, including acute enteric infections, resulting from the proliferation of pathogenic microorganisms and shifts in the habitats of insect and rodent vectors;
- Water and food supply challenges, as droughts, floods, and other extreme weather events impede access to clean drinking water and compromise food security due to declining crop yields;

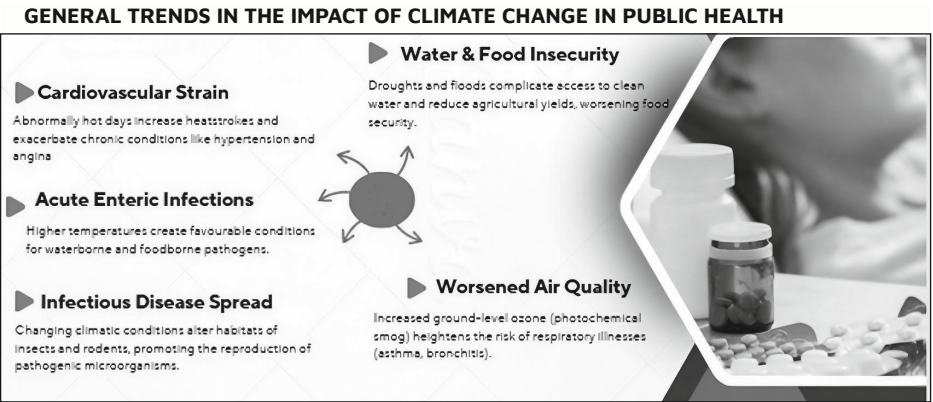


Fig. 2. General trends in the impact of climate change on the public health of Ukrainians.

- Deteriorating air quality, as elevated concentrations of ground-level ozone (a key component of photochemical smog) increase the risk of developing asthma, bronchitis, and emphysema. Figure 2 illustrates the general trends of climate change impact on the public health of Ukrainians.
- War exponentially amplifies pre-existing peacetime climate risks and introduces a range of new ones. Specifically, persistent shelling and fires result in significant emissions of toxic substances which, combined with climatic factors, drastically deteriorate air quality and lead to an increase in respiratory diseases. Furthermore, military operations contaminate water resources, while the destruction of critical infrastructure – particularly in the water supply sector – coupled with climatic

droughts, results in a significant portion of the population in conflict zones losing access to safe drinking water. This serves as a direct risk factor for the spread of acute enteric infections. The impact of war on the mental health of Ukrainians is particularly pronounced. Prolonged chronic stress, exacerbated by high ambient temperatures and other climatic factors, can reduce productivity and lead to emotional exhaustion, anxiety, and impaired concentration. The populations most vulnerable to this combined impact include children, the elderly, and residents of areas with inadequate sanitary conditions and high levels of destruction. Figure 3 presents the dynamics of circulatory system diseases in Ukraine. According to the Ministry of Health, in recent years the number of patients

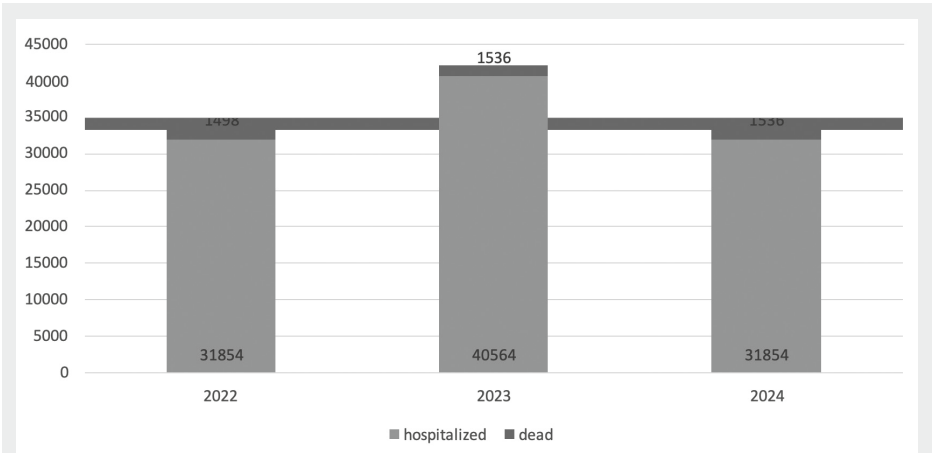


Fig. 3. Dynamics of circulatory system diseases in Ukraine for the period 2022-2024

15 Ukraine

War's carbon footprint and the combined climate-health crisis in Ukraine

receiving free care for heart attacks in medical institutions has been growing rapidly and currently amounts to 89%, while in 2022 there were 56% of such patients^[9].

The situation regarding infectious diseases in Ukraine has significantly deteriorated during the war. Specifically, the rabies situation is critical: a rapid increase in cases is being documented due to the suspension of aerial vaccination for wild animals, the absence of hunting, and the disruption of ecosystems. The population of foxes, which serve as the primary carriers, is growing uncontrollably, leading to attacks on livestock and humans, particularly in the Dnipropetrovsk and Kharkiv regions. In 2024, the number of medical consultations resulting from rabid animal bites rose to 2,427, exceeding figures from previous periods.

Furthermore, acute enteric infections and viral hepatitis A are spreading due to damaged water supply networks, lack of access to clean water, and chal-

lenges in maintaining hygiene, especially in active combat zones.

CONCLUSIONS. The full-scale war has significantly increased greenhouse gas emissions due to the use of military equipment, fires, destruction of infrastructure, and deforestation, reducing ecosystems' capacity to absorb CO₂.

Military operations and aviation intensify the carbon footprint and worsen the environmental situation, contributing to global climate change.

The combined impact of climate change and war increases health risks for the population, including heat-related illnesses, cardiovascular and respiratory diseases, and the spread of infections. Damage to infrastructure and water contamination limit access to safe drinking water and contribute to the spread of intestinal infections and hepatitis A.

The war has a negative impact on mental health, with children, the elderly, and residents of heavily affected areas being the most vulnerable groups. —

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16 Yemen

Factors Related to Knowledge, Attitudes, and Behaviors Regarding Cervical Cancer Among Yemeni Women

Boshra Ali

ABSTRACT. BACKGROUND. Cervical cancer (CxCa) is the fourth most common and fatal cancer among women worldwide. The majority of new cases and deaths occur in low- and middle-income countries (LMICs), where screening and vaccination programs are limited. In Yemen, the absence of national screening and HPV vaccination policies contributes to late-stage diagnosis and poor outcomes.

OBJECTIVE. This study aimed to evaluate knowledge, attitudes, and practices regarding cervical cancer prevention among Yemeni women and to identify factors influencing awareness and preventive behaviors.

Methods: A cross-sectional study was conducted among 399 women in Sana'a, Yemen. Data were collected using a face-to-face questionnaire. Logistic regression analysis was used to examine associations between knowledge, attitudes, and preventive behaviors (awareness of cervical cancer, belief in its treatability and preventability, awareness of the Pap smear test, and undergoing Pap smear testing) and sociodemographic variables including age, education, employment status, and family history of cervical cancer.

Results: The mean age of participants was 35.3 years. Most women (79.2%) worked outside the home and 88.5%

reported no family history of cervical cancer. Higher education was significantly associated with awareness of cervical cancer. Women working outside the household were more than four times as likely to be aware of cervical cancer and were more likely to know that it is preventable and treatable. Women with a family history of cervical cancer were twice as likely to be aware of the disease and more likely to have heard of and undergone Pap smear testing. Age and diagnosis status were not significantly associated with awareness.

CONCLUSION. There is a substantial gap in awareness and preventive practices regarding cervical cancer among Yemeni women. Public health interventions should prioritize women with lower educational levels and those not working outside the home. Implementing organized screening programs and expanding access to early detection services are urgently needed to improve outcomes.

INTRODUCTION. Cervical cancer (CxCa) remains a major global health challenge. It is the fourth most common cancer among women worldwide (Singh et al., 2023). According to the World Health Organization, approximately 20 million new cancer cases are

projected globally by 2030 (Assoumou et al., 2015; Manikandan et al., 2019). Nearly 90% of cervical cancer cases and deaths occur in low- and middle-income countries (LMICs), reflecting disparities in access to prevention, screening, and treatment services (Örenli, 2015; Stewart & Wild, 2014).

Persistent infection with the Human papillomavirus (HPV) is recognized as the primary cause of cervical cancer (Kim et al., 2021). Effective prevention strategies include HPV vaccination and routine screening using Pap smear testing to detect precancerous lesions early (Gümüş Öncel, 2016; Reis et al., 2011).

In Yemen, limited epidemiological data make it difficult to fully assess the burden of cervical cancer. Currently, there are no national screening programs or official HPV vaccination policies. Screening services are scarce, and most cases are diagnosed at advanced stages. Furthermore, many affected women are unable to access comprehensive treatment services, resulting in high mortality rates (YHM, 2014).

Understanding women's knowledge, attitudes, and preventive behaviors is essential for developing effective public health interventions. This study therefore aimed to evaluate awareness and practices related to cervical cancer prevention among Yemeni women and to identify factors influencing these outcomes.

METHODS. Study Design and Setting: A cross-sectional study was conducted among 399 women in Sana'a, Yemen.

Data Collection: Data were collected using a structured, face-to-face questionnaire. The questionnaire assessed: Awareness of cervical cancer, Beliefs regarding its treatability and preventability, Awareness of the Pap smear test, History of undergoing a Pap smear test, Sociodemographic variables included age, education level, employment status (working outside the household vs. not), and family history of cervical cancer.

Statistical Analysis: Logistic regression analysis was used to determine associations between indicators of knowledge, attitudes, and preventive behaviors and independent variables. Statistical significance was assessed to identify factors influencing awareness and screening practices.

RESULTS. Participant Characteristics:

The mean age of participants was 35.3 years. Women in the non-cancer group were significantly younger than those in the cancer group. 79.2% of participants worked outside the household. 88.5% reported no family history of cervical cancer.

FACTORS ASSOCIATED WITH AWARENESS OF CERVICAL CANCER.

Education: Compared to illiterate women, only women with higher education (university level) were significantly more

#16 Yemen

Factors Related to Knowledge, Attitudes, and Behaviors Regarding Cervical Cancer Among Yemeni Women

likely to be aware of cervical cancer.

Employment Status: Women working outside the household were more than four times more likely to be aware of cervical cancer than those working exclusively at home.

Family History: Women with a family history of cervical cancer were twice as likely to be aware of cervical cancer.

Age and Diagnosis Status: Age and being diagnosed with cervical cancer were not significantly associated with awareness.

Knowledge of Treatability and Preventability: Working outside the household was the only factor significantly associated with knowing that cervical cancer is both treatable and preventable.

Awareness and Practice of Pap Smear Testing: Women with a family history of cervical cancer were more likely to have heard of the Pap smear test and more likely to have undergone the test.

DISCUSSION. This study revealed important gaps in awareness and preventive behaviors regarding cervical cancer among Yemeni women.

Interestingly, being diagnosed with cervical cancer did not significantly influence knowledge levels. This finding may appear counterintuitive, as personal experience with the disease might be expected to increase awareness. However, it should be noted that it is common in Yemen to not inform patients about having cancer. When we conducted our study, we were fre-

quently requested by a relative of the participant to not mention to her that she had already been diagnosed with CxCa. We were able to do interviews with some patients only under this condition.

When we asked relatives for the reason to conceal such a fact, they said, "If patients know about diagnosis, they would refuse the treatment and their psychological wellbeing would be negatively affected". Similar situation was identified in other LMICs (Ghose et al., 2019)

Educational attainment was a key determinant of awareness. Only women with university-level education demonstrated significantly higher knowledge compared to illiterate women. This might be explained by the poor health-related content of the Yemeni school curriculum, even before the war, since the education system had never been adequate. After the war, the country lost the opportunity to improve its school system (Muthanna, 2015).

Family history also played a significant role. Women with affected relatives were more likely to be aware of cervical cancer and engage in preventive practices. Even if women are unaware of their own risk, family experiences may encourage them to seek information and screening services (Shahrukh K. Hashmi et al., 2022).

Employment outside the home was another significant factor associated with improved knowledge. Working women

may have greater exposure to information, social networks, and healthcare messaging. These results might be interpreted within the context of market integration. Market integration is a process that involves transition from agricultural activities to occupations that are not directly related to subsistence, such as market work or education-based employment, but also involves broader economic and sociocultural changes that accompany this process. The market integration process leads to health and environmental changes (Gildner et al., 2020; Houck et al., 2013).

CONCLUSION AND RECOMMENDATIONS. This study demonstrates a substantial lack of awareness and preventive practices related to cervical cancer among Yemeni women. Identifying this

knowledge gap is a critical first step toward implementing effective prevention programs.

Public health initiatives should:

- Develop and implement national cervical cancer screening programs.
- Introduce official HPV vaccination policies.
- Target women with lower educational levels.
- Reach women who do not work outside the home, as they are at higher risk of limited awareness.
- Promote early detection through accessible Pap smear screening services.

Most cervical cancer cases in Yemen are diagnosed at advanced stages, resulting in poor outcomes. Early detection through organized screening programs can significantly improve survival rates and reduce mortality. —

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16 Yemen

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Deutsch-Jemenitischer Ärzteverein



German-Yemeni Doctors Association (DJA EV) was founded in 2011 as a non-profit medical association dedicated to strengthening medical cooperation, scientific exchange, and professional collaboration between Germany and Yemen. DJA EV serves as a platform connecting medical expertise, humanitarian responsibility, and international partnership to support sustainable improvements in healthcare.

Healthcare development extends beyond clinical treatment and medical interventions. It also requires strengthening professional education, capacity building, research collaboration, and knowledge transfer—essential components for improving healthcare systems and outcomes. From its foundation, DJA EV has promoted cross-border medical cooperation by connecting healthcare professionals, institutions, and experts across Germany and Yemen.

A central component of DJA EV's mission is facilitating international scientific and medical exchange. Through specialized training programs, workshops, seminars, conferences, and professional networking activities, DJA EV enables physicians and healthcare professionals to share expertise, exchange best practices, and enhance their clinical and academic skills. These initiatives contribute to continuous professional development and the advancement of evidence-based healthcare.

DJA EV also supports medical missions, specialist healthcare projects, and humanitarian initiatives aimed at improving access to quality medical services. By collaborating with healthcare institutions and professionals, the association contributes to strengthening medical structures through education, technical support, and targeted healthcare interventions.

By connecting physicians, researchers, and healthcare professionals from diverse backgrounds, DJA EV fosters a sustainable international network that promotes scientific cooperation, mentorship, and shared responsibility in medicine. Through these efforts, DJA EV continues to build bridges between Germany and Yemen and contribute to the advancement of healthcare through knowledge exchange and collaborative action.

Join us!

E-Mail:

info@djaev.org

Website:

www.djaev.org

Unissued Diplomas

Unissued Diplomas is an international project aimed at commemorating the lost lives of students whose lives were taken by the Russian invasion. Those students, supposed to get them, were killed by Russia and never became graduates.

They sacrificed their education, life goals, aspirations and dreams for the sake of their country. We are creating this exhibition to remind the world about the ongoing war and the price we, as a nation, are paying daily.

Through the unissued diplomas, the exhibition uncovers the stories of 40 Ukrainian students killed in the full-scale Russian invasion. Our first wave of exhibitions in 2023 was held in 110+ locations worldwide. Since Russia's brutal actions continue to rise, we continue our project and aim to cover more countries, world regions and universities.



Opening of the exhibition Unissued Diplomas at Akkon University on the occasion of the 7th International Young Researchers' Symposium on Global Health 2025





7TH INTERNATIONAL YOUNG RESEARCHERS' SYMPOSIUM ON GLOBAL HEALTH

**October 11th & 12th, 2025 –
Satellite Symposium of the World Health Summit 2025**

Venue: Akkon University of Applied Sciences

Colditzstr. 34-36, 12099 Berlin, Germany, room D/E &
virtual (<https://johanniter-de.zoom.us/j/81812405132>)

INTRODUCTION

The Institute for Research in International Assistance (IRIA) works on various projects for the improvement of health care in different settings. For this, many international collaborative projects have been established. In order to bring together its partners for a scientific exchange, a platform for young researchers has been launched that is now preparing for its 7th symposium. IRIA welcomes young researchers in various fields of global health both on site and virtually connected at the 7th symposium.

It is planned to publish all contributions in Akkon University's Schriftenreihe as a compendium.

Preliminary Program October 11th, 2025

12:30 h Registration
(CET)

13:00 h Introduction & Welcome
(CET)

Prof. Dr. Andreas M. Bock,
President Akkon University
Prof. Dr. med. Dr. PH Timo Ulrichs,
Vice President Akkon University,
Director Institute for Research in
International Assistance (IRIA),
Head of Study Program Int. Disaster and Emergency Relief
N.N.,
Federal Ministry of Health

13:15 h **Opening of the exhibition "Unissued Diplomas"**
(CET)

Introduction:
Renata Chechel, Unissued Diplomas Initiative, Kyiv, Ukraine (online)
Prof. Dr. Hanna Saturdays, Ternopil National Medical University, Ukraine

13:45 h
(CET)

International Young Researchers' Presentations

Facilitator:

Philipp Endler, IRIA/Akkon University

- South Africa – Institute in Indigenous Knowledge Systems,
South Africa, University of KwaZulu-Natal, South Africa, North West
University, South Africa

Diane Thelma Molokwa, Dr. Mayashree Chinsamy:

Promoting Inclusive, African Indigenous Knowledge Systems-Based
Disaster Trauma Risk Reduction Management for Sustainable Futures

- South Africa – Stellenbosch University

Dr. Christian Lueme:

Climate Change and Primary Health Care in Sub-Saharan Africa

- Kenya – University of Nairobi

Cyrus Kimanthi:

Opportunities for climate-sensitive work in the health sector –
Kenya and Germany in focus

14:30 – 14:45 h
(CET)

Coffee Break

Facilitator:

Prof. Dr. Mathias Bonk, Akkon University

- Antigua - American University of Antigua, College of Medicine (online)
Srusti Shenoy (presenter), Devyani Dogra, Rathika Shenoy,
Leslie Walwyn, Juan Acuna:

Correlates of Postpartum Relapse to Smoking among Women Who
Quit Combustible and Electronic Nicotine Products During Pregnancy
using Pregnancy Risk Assessment Monitoring System Phase 8
(2016–2022) Data

- Antigua - Collaboration of AUA with Mc MacSurgery,
MacMasters University (online)

Nathalie Camacho, Tahira Perry, Ana Perez, Ramya Puttagunta,

Oluwabamise Afolabi (presenter), Juan Acuna:

Tissue Adhesives versus Sutures for Laparoscopic Surgery Port Hole
Closure: A Systematic Review and Meta-Analysis

Facilitator:

Fiona Hutton, London School of Hygiene and

Tropical Medicine/Akkon-Alumni

- Brazil – Somos, ifa/IRIA fellow

Dr. Caio Klein:

Critical analysis of torture and cruel treatments and their implications
for prison health in Brazil

- Bolivia – Instituto de Estudios Avanzados en Desarrollo,
ifa/IRIA fellow (online):

Lucia García:

Climate-related health challenges confronting Andean quinoa producers

15:45 h

Departure to

17:00 – 20:00 h
(CET)

Virchow Prize Ceremony

Great Ceremonial Hall of the Red City Hall

Rathausstr. 15, Berlin, 10178 German (on invitation), networking

Program October 12th, 2025

09:00 h
(CET)

International Young Researchers' Presentations

Facilitator: Valentin Nolden, Akkon University

- Armenia – European University
N.N.
 - Germany/Georgia – Akkon University/IRIA,
TU Braunschweig, Petre Shotadze Tbilisi Medical Academy
Silvia Zanetti, Manizha Khakimova,
Nana Katchiuri, Mariam Kevkhishvili:
Engagement Global ASA-Program 2025:
„Creatively communicating Air Pollution in Georgia“
 - Ukraine – Lutsk National Technical University
Olha Bukareva and Sofiia Omelianchuk (online):
The impact of Climate Change on the Health of Ukrainians:
Warfare and Carbon Footprint
 - Ukraine – Ternopil National Medical University
Nepelyak Sofiia, Kalchenia Yuliia:
Effect of the War in Ukraine on the Mental Health of medical students
and level of Anxiety of Children
- Facilitator: Mara Burkhard, IRIA/Akkon University
- Yemen – Deutsch-Jemenitischer Ärzteverein (DJAEV) Bushra Ali:
Factors related to knowledge, attitudes and behaviours regarding
cervical cancer among Yemeni women
 - Egypt/ UK – Glasgow University, ifa/IRIA fellow (online)
Reem Elshafaie:
Women in MENA: The Mental Health Impact of STIs and HIV

10:30 – 10:45 h
(CET)

Coffee Break

Facilitator: Gaby Feldmann, IRIA/Akkon University

- Pakistan – University of Lahore (online)
Fatima Noreen:
Perceived Causes and Effects of Overcrowding among Emergency
Health Care Workers of Azad Jammu and Kashmir
 - Malaysia – Universiti Malaysia Sabah, ifa/IRIA fellow
Dr. Zhen Zhen Lo:
Enhancing Emergency Care in Resource-Limited Settings in Sabah,
Malaysia
- Facilitator: Prof. Dr. Omar Sahrai, Akkon University
- Indonesia – Universitas Muhammadiyah Kalimantan Timur:
Muhammad Ardi Wijaksana, Naufal Faryreza Ryanta,
Lisa Wahidatul Oktaviani, Nida Amalia:
A Comprehensive Digital and Behavioral Intervention to Mitigate
Chemical Exposure Risks Among Pest Control Technicians in Indonesia
 - Germany – Akkon University
Valentin Nolden, Finja Höfer, Denise Riznar:
Beyond the Battlefield: How the Joint Medical Service of the German
Armed Forces Supports German Healthcare

11:45 – 12:00 h **Summary & Outlook**

(CET)

Facilitator: Prof. Dr. med. Dr. PH Timo Ulrichs, Akkon University/IRIA

Subsequent visit (on invitation):

October 12th–14th, 2025

World Health Summit Berlin, Germany & Digital

(<https://www.worldhealthsummit.org>)

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VIRCHOW
FOUNDATION



Akkon/IRIA team with international participants of IYRS 2025

Future Minds in Global Health

This volume brings together contributions from the International Symposium of Young Researchers' on Global Health, a platform for scientific exchange, dialogue and collaboration between students, early-career researchers and professionals from various countries and disciplines.

Organized by the Akkon University of Human Sciences and the Institute for Research in International Assistance (IRIA), the symposium gives emerging voices the opportunity to present their research, ideas and practical perspectives on some of the most pressing challenges in global health – such as, global food chain adaptation in light of climate change.

At a time when conflict, climate change, social inequalities, migration, mental health, infectious diseases, digital transformation and sustainable development are increasingly interconnected, global health requires more than technical solutions. It calls for interdisciplinary thinking, international cooperation and a shared commitment to equity, resilience and responsibility. This cross-boundary approach is perfectly depicted by the 16 contributions of this year's publication, covering topics ranging from analyses of climate change impact on primary health care to systemic revisions of Global Health responses to pandemics and sanitary crises.

The collected contributions reflect the diversity, curiosity and commitment of a new generation of global health researchers. Thus, the 8th volume of the Akkon Schriftenreihe continues to foster space for innovative inquiries, critical analysis and remains a stepping stone for future partnerships – demonstrating how young researchers can both support and take the lead in shaping more equitable, sustainable and responsive health systems worldwide.



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