Abstract Book

Proceedings of the International Conference on Occupational Surveillance and Environmental Health - IC-OSEH 2025

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International Conference on Occupational Surveillance and Environmental Health (IC-OSEH 2025)

Conference Proceedings – Abstracts

Volume 1

This booklet gathers the abstracts presented during the International Conference on Occupational Surveillance and Environmental Health (IC-OSEH), organized within the framework of the BIONET project (Euro-African Biomonitoring Network for the assessment of environmental exposure in population through universities and occupational health services), focusing on Environmental Health and Occupational Monitoring across Europe and Africa.

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PREFACE

On behalf of the Conference co-chairs and editors, it is our distinct pleasure to introduce the Proceedings of the ***International Conference on Occupational Surveillance & Environmental Health (IC-OSEH)***, convened in Fez, Morocco, under the auspices of the Euro-African **BIONET project**, coordinated by the **Katholieke Universiteit Leuven** in the framework of the Erasmus+ CBHE programme.

The 2025 edition of this international event, organized from 19-21 November 2025 and co-hosted by the Euro-Mediterranean University of Fez and Moulay Ismail University of Meknes, marked a significant milestone in advancing cross-continental collaboration on environmental and occupational health challenges, with a particular emphasis on innovative sentinel surveillance systems and human biomonitoring in both high-income and low- and middle-income contexts.

We received research submissions spanning a wide range of advanced technology and methodological areas, reflecting the dynamic evolution of environmental and occupational health sciences. Following a rigorous peer-review process, conducted with the dedicated support of our Scientific Committee members and external reviewers, more than 120 submissions from different European and African countries were evaluated. Of these, 59 high-quality abstracts were selected for presentation and inclusion in this volume.

The accepted contributions were presented across 8 parallel sessions over two days of conference activities, organized within a hybrid format that combined physical presence in Fez with virtual participation. The scientific programme was anchored by an inaugural session and complemented by 8 keynote addresses from distinguished global leaders in occupational safety, environmental health, and surveillance systems from Europe, USA and Africa. The third day served as a science-policy interface that fostered dialogue between researchers, public health authorities, and institutional stakeholders, thereby promoting the translation of scientific evidence into effective occupational and environmental health policies.

IC-OSEH 2025 attracted a vibrant international audience, including pioneering academic experts, young researchers, health professionals, students, and policy experts, all engaged in critical dialogue on the state of the art and future directions in environmental and occupational health research and practice in Africa. The diversity of perspectives and disciplinary expertise represented at the conference underscores the growing recognition of the interconnectedness between work, environment, and population health.

These proceedings are intended to serve as a lasting record of the scientific exchange that took place in Fez and to provide a foundation for future collaborations, innovations, and policy developments. We trust that the work contained herein will stimulate further inquiry and contribute meaningfully to the global and African discourse on safeguarding health in the face of evolving environmental, climate and occupational risks.

We extend our deepest appreciation to all authors, reviewers, session chairs, keynote speakers, local co-organizing committee, sponsors, and partners whose contributions made this conference a success.

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About the BIONET Project

BIONET (Euro-African Biomonitoring Network for the assessment of environmental exposure in population through universities and occupational health services) is an Erasmus+ Capacity Building in Higher Education (CBHE) project co-funded by the European Union. The project aims to strengthen collaboration between higher education institutions, research centers, and public health stakeholders working at the interface of biodiversity, environmental health, occupational health, and public health.

About the International Conference on Occupational Surveillance and Environmental Health (IC-OSEH 2025)

The International Conference on Occupational Surveillance and Environmental Health (IC-OSEH) is an international scientific event organized within a European-funded cooperation framework. It brings together researchers and institutions from Europe and Africa working in the fields of occupational health, environmental health, and public health surveillance. The conference focuses on the development and implementation of innovative sentinel systems, data integration approaches, and interdisciplinary strategies aimed at better understanding, monitoring, and preventing health risks related to environmental and occupational exposures.

The IC-OSEH 2025 conference took place in Fez, Morocco, from 19 to 21 November 2025, within the framework of the Erasmus+ Capacity Building in Higher Education BIONET project. It provided a platform for scientific exchange on key topics including occupational surveillance, environmental monitoring, One Health approach, and international research collaboration.

This booklet compiles the abstracts presented during the conference, reflecting the diversity of research themes, methodological approaches, and geographical contexts represented within the BIONET consortium.

Conference Topics

- Occupational surveillance and risk assessment related to work landscape
- Environmental Exposure Assessment and Human Biomonitoring
- Signs, early effects and diseases related to exposure
- One Health, Sustainable Ecosystems and the Environment
- Protection and Safety at work
- Public Engagement and Citizen Science for Healthy, Resilient, and Sustainable Urban Environments
- Wellbeing through Healthy Living Environments and Work Settings
- Digital and Technological Innovations for Safer, Healthy and Greener Future

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BIONET Consortium

The BIONET consortium brings together partner universities and research institutions from Europe and Africa and jointly organized the IC-OSEH 2025 conference. The consortium includes KU Leuven (Belgium), IDEWE (Belgium), University of Luxembourg (Luxembourg), Laboratoire National de Santé (Luxembourg), Aarhus University (Denmark), Moulay Ismail University of Meknes (Morocco), Euro-Mediterranean University of Fes (Morocco), University of Parakou (Benin), Abomey-Calavi University (Benin), Hawassa University (Ethiopia) and Jimma University (Ethiopia).

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Keynote Abstracts

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Approaches for Sentinel Screening

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Abstract:

Public health surveillance is a fundamental pillar of population health protection, aiming to detect emerging threats, monitor temporal and spatial trends in diseases and exposures, and anticipate and/or evaluate the effectiveness of interventions and policies. Within this framework, sentinel surveillance represents a targeted and strategic approach that prioritizes data quality, timeliness, and feasibility. Rather than relying on exhaustive population-wide data collection, sentinel surveillance focuses on selected sites and providers, referred to as "sentinels", that are strategically positioned in a sentinel Network. Their role is to capture early signals and provide situational awareness. This approach has been foundational in infectious disease control, particularly for influenza and poliomyelitis, and is increasingly recognized as a valuable model for broader public health applications.

Sentinel surveillance is grounded in the principle that trends observed within carefully selected sentinel sites accurately reflect patterns occurring in the wider community. Methodologically, it often relies on a single or a limited number of health facilities, workplaces, or laboratories that are responsible for collecting standardized data on enrolled cases. These sites typically operate within a voluntary network involving physicians, laboratories, and public health authorities, enabling the systematic assessment of exposures, health status, disease occurrence, and associated risk factors within a defined population. Provider-based sentinel networks, including general practitioners, occupational physicians, or specialized healthcare providers, report predefined cases or syndromes, enabling highly standardized and clinically relevant reporting. Compared with general surveillance systems, which aim for comprehensive coverage and burden estimation, sentinel surveillance is designed to support early detection, trend analysis, and hypothesis generation, while optimizing resources and operational capacity.

Sentinel surveillance has expanded to address non-communicable diseases, environmental exposures, and occupational risks. In environmental and occupational health, this approach supports early identification of emerging hazards, monitoring of exposure-response, and evaluation of preventive measures. In this context, a human sentinel surveillance platform (HSSP) has been developed by KU Leuven and IDEWE in Belgium as an integrated framework that brings together sentinel health services, laboratories, and practitioners to systematically collect clinical, exposure, and biomonitoring data. Such platform enables coordinated human biomonitoring, strengthens data comparability, and facilitates the translation of scientific evidence into actionable public health and occupational health insights.
The HSSP has been piloted in Belgium through the EIRENE-Flanders (FWO funding) and PARC (EU funding) projects, and has been deployed in Africa in the framework of the BIONET Erasmus+ project. The platform is being adapted to monitor psychosocial risks in conflicted areas in the MENA region, for better preparedness and resilience of health systems (VLIR-UOS funding).

In conclusion, sentinel surveillance can be considered a valid and efficient methodological approach for future studies and research aiming to assess health concerns and exposures. Health and occupational medicine services, when engaged as sentinel sites, represent a strategic gateway for implementing human biomonitoring in a cost-effective and operationally feasible manner. The involvement of general and occupational physicians allows time-efficient recruitment of participants and enhances the clinical relevance of collected data. Importantly, data and results generated through sentinel studies can have significant impact on policy development and implementation, supporting evidence-based planning, prevention strategies, and regulatory actions through close collaboration with health and medical services.

Keywords : Sentinel surveillance, Occupational health, Environmental health, Public health.

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Environmental Health Landscape in Morocco : Toward systemized and integrative approaches

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Abstract:

African countries are facing rapid urbanisation, agricultural intensification, climate variability, and expanding industrial activities. These trends increase population exposure to complex mixtures of pollutants. Growing evidence from Africa shows that environmental and occupational exposures contribute significantly to the burden of non-communicable diseases, neurodevelopmental deficits, reproductive disorders, and cancers. In Morocco, recent studies have begun to characterise exposures to pesticides, heavy metals, air pollution, and emerging contaminants, integrating biomonitoring, oxidative stress markers, endocrine disruption, and multi-omics approaches. Epigenetics has emerged as a key mechanism linking environmental exposures to long-term health effects. This convergence is critical in a region where early-life exposures and vulnerable populations are a priority.

Objectives: This abstract synthesises recent Moroccan and African research efforts in environmental and occupational health, highlights their scientific and societal relevance, and discusses opportunities for advancing this field.

Methods & Key Results: Morocco's recent investigations combine epidemiological studies, controlled experiments, and high-resolution biomonitoring using LC-MS/GC-MS for pesticide metabolites, metals, cytostatic drugs, endocrine disruption and oxidative stress biomarkers. Several studies demonstrate associations between pesticide exposure in agricultural workers and alterations in cholinesterase activity, oxidative stress, and emerging DNA methylation signatures. Research on urban pollution and atmospheric particulate matter highlights increased inflammation and genotoxicity risks, while pilot exposome-based studies integrate sensors, GIS data, and omics layers. Importantly, Moroccan-led and African collaborative projects (mainly in the framework of Belgian University Cooperation, US-based partnerships and Erasmus+ projects) are building capacity in environmental toxicology, epidemiology, risk assessment, and decision-making tools.

Significance for Morocco and Africa:

1. Public health impact: Morocco faces increasing incidence of NCDs and chronic environmental diseases, making early biomarkers essential for prevention and policy action.
2. Agricultural and occupational exposures: High pesticide use, informal labour, and weak regulation require robust evidence to guide safer practices and regulatory reforms.
3. Epigenetic insights: Epigenetic biomarkers offer opportunities for early detection of harm, identification of vulnerable subgroups, and personalised prevention strategies.
4. Capacity building: Moroccan research teams, such as the Laboratory of Bioactives, Health and Environment at the Faculty of Sciences - Moulay Ismail University of Meknes, through international initiatives like the BIONET Erasmus+ project are contributing to capacity building efforts and creating frameworks for young researchers, workers and communities to thrive.

Challenges: Despite scientific advances, multiple challenges persist. Fragmented research systems, limited long-term funding, insufficient toxicological and epidemiological infrastructures, lack of harmonised biomonitoring programmes, slow administrative approvals are some of the challenges. Furthermore, regulatory frameworks for chemicals and occupational health remain underdeveloped, and vulnerable populations (workers, women, children) are often underrepresented in research. Translation of scientific findings into policy remains uneven, partly due to weak science-policy interfaces.

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Opportunities: Morocco is uniquely positioned to advance environmental health, exposomics, and epigenetics research thanks to a combination of scientific capacity, strategic national priorities, and growing international partnerships. Key opportunities include:
1. Building a national environmental and occupational health research infrastructure, as Morocco can expand existing laboratory platforms into a national reference, supporting routine monitoring of pollutants and emerging contaminants. The country already has advanced LC-MS/GC-MS capabilities, offering a strong foundation for large-scale exposome cohorts.
2. Developing Moroccan exposome cohorts and biobanks: There is an opportunity to establish population-specific cohorts-farmers, healthcare workers, children, and urban populations- integrating questionnaires, environmental measurements, omics, and epigenetic data. Such cohorts would fill major gaps in African datasets and support personalized prevention, especially in endocrine disruption, neurotoxicity, and chronic disease pathways.
3. Leveraging Morocco's digital transformation for Geo-AI early warning systems : With rapid advances in digital governance, remote sensing, health information systems, and national AI strategies, Morocco can implement AI-based risk prediction tools to map hotspots, detect early signs of occupational risks (e.g., cytostatic drug exposure), and monitor environmental threats in real time. Geo-AI can be linked to existing public health surveillance systems.
4. Strengthening the science-policy interface: Current reforms in health, agriculture, and environmental governance create momentum for evidence-based regulation. Morocco can develop national guidelines for chemicals use, protective measures and work safety, which are aligned to international standards. Scientific advisory panels could formalize exchanges between researchers, ministries, and civil society.

Conclusion: Environmental health research in Morocco is rapidly advancing, generating critical insights into how environmental exposures affect population health. Integrating these efforts within the national strategic agendas will support evidence-based policies, accelerate innovation, and contribute to a healthier, more resilient environments. Strengthening research infrastructures, promoting cohort studies, and embedding digital approaches in health surveillance represent transformative opportunities for Morocco in the coming decade.

Keywords : Environmental health, pollutants, occupational exposure, Morocco.

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Tracking the Invisible using Human Biomonitoring

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Abstract:

Introduction
Human biomonitoring (HBM) is a key approach for making otherwise "invisible" chemical exposures measurable by quantifying hazardous substances, their metabolites, and selected biochemical/biological effect parameters in human biological materials. It is particularly relevant in a "chemical world" where multiple contaminants co-occur across air, food, water and dust, and where exposure typically occurs as complex mixtures rather than as single substances.
The European Human Biomonitoring Initiative (HBM4EU) illustrates how HBM can be operationalized at scale through a flexible "multitrack" model that enables countries to contribute via HBM embedded in health examination/interview/nutrition surveys, targeted cross-sectional studies, and longitudinal cohorts, while building on existing national capacities. Aligned population studies carried out between 2014 and 2021 included children (6–11 years), teenagers (12–19 years) and adults (20–39 years), applying harmonised descriptors (e.g., socio-economic status, DEGURBA, ISCED) and excluding hotspot areas to support population-level comparability. Across aligned datasets, younger age groups are reported to often show higher biomarker levels than older groups, consistent with higher intake per kilogram body weight, higher inhalation rates, increased dust contact, and behaviours such as hand-to-mouth activity.

Methods
HBM data can also support risk-management and policy discussions by estimating the proportion of participants exceeding health-based HBM guidance values—situations in which adverse health outcomes cannot be excluded—for substances and mixtures including PFAS, acrylamide, phthalates, and inorganic arsenic.

Results
HBM application beyond Europe ca be also illustrated through two Moroccan case studies: urinary glyphosate and AMPA measurements in 48 children (3–12 years) from the Saiss plain (ethics approval in December 2018), and a cross-sectional study in Meknes (April–May 2021) of 93 schoolchildren (5–11 years) assessing brominated flame retardants and metals. Brominated flame retardants were detected in 54.84% of samples and metals in >90%, and several determinants were linked to transport mode, cleaning practices, and proximity to emission sources.

Conclusion
Finally, HBM is positioned as a cornerstone for next-generation chemical risk assessment within PARC (the EU Partnership for the Assessment of Risks from Chemicals), which builds on HBM4EU experience to improve protection of human health and the environment through stronger evidence, methods and tools.

Overall, HBM is positioned as a tool to strengthen exposure surveillance, improve comparability across settings, and inform targeted risk-management measures for vulnerable populations and workers

Keywords: human biomonitoring, real-life exposure, HBM4EU, PARC, BIONET

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Building a culture of health: Listening and learning from workers to change the conditions of work

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Abstract:

Introduction
A culture of health extends beyond individual wellness programs; it encompasses organizational policies, programs, and practices that foster healthy and safe working conditions. While traditional workplace safety and health surveillance programs monitor hazards and detect emerging issues, qualitative analysis is often essential to uncover root causes of workplace stressors—particularly psychosocial factors. Worker voice and participatory approaches enable organizations to listen, learn, and improve working conditions by identifying these root causes, including unique local factors that influence safety, health, and well-being.

Methods
For over two decades, the Harvard T.H. Chan School of Public Health Center for Work, Health, and Well-being has developed, implemented, and evaluated strategies to embed health into organizational frameworks across multiple sectors and countries. The multidisciplinary center employs a systems approach to design and assess the effectiveness of interventions, while examining factors that influence both worker outcomes (injury, illness, well-being) and enterprise outcomes (health care costs, turnover, retention, productivity).

Results
The center's systems framework emphasizes the conditions of work—physical, organizational, and psychosocial factors—based on the premise that these conditions directly affect worker safety, health behaviors, injuries, and illnesses. The framework demonstrates that both working conditions and worker health outcomes influence enterprise outcomes. In turn, improving worker safety and health requires organizations to focus on policies, programs, and practices that shape these conditions. Context matters: each workplace operates within a specific sector and labor market, which in turn exists within broader social, political, and economic environments.

A recent systematic review found that, regardless of intervention type, those that enhanced opportunities for worker voice and participation were more reliably able to improve well-being. Two intervention studies conducted by the Center—one in construction and one in a fulfillment (warehouse) center—used worker voice to improve working conditions. Process tracking confirmed that these interventions changed conditions of work, and in the fulfillment center, quantitative analysis revealed reductions in psychological distress and turnover at intervention sites.

Conclusion
Organizational strategies that build infrastructure for decision-makers to listen to and learn from workers can drive meaningful changes in working conditions through improved policies and practices.

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Health Effects of Chemical Exposures - the Broad Perspective

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Abstract:

Chemical exposures, broadly defined, are ubiquitous worldwide in the general population and occur at even higher levels among workers. Classical examples include ambient and indoor air pollution, pesticides, lead, silica, asbestos fibers, and mercury. Causal inference is often relatively straightforward for acute health effects of chemical exposures, such as those resulting from industrial toxic spills or extreme air pollution episodes.

In contrast, establishing causality for chronic health outcomes with multiple competing causes—such as lung cancer or chronic obstructive pulmonary disease—requires robust epidemiological methods and accurate exposure assessment and assignment to disentangle the effects of chemical exposures.

Non-communicable diseases (NCDs) are by far the leading cause of death globally, and chemical exposures contribute substantially to the burden of many NCDs. Evidence from twin studies suggests that environmental exposures may play a much larger role than genetic factors in the development of NCDs. Nevertheless, substantial data gaps remain, limiting our ability to assess the importance of specific chemical exposures and gene–environment interactions.

There is a particular need for studies conducted outside Europe and the United States, including on the African continent. While air pollution, heavy metals, and pesticides are among the most frequently studied exposures in environmental health research in Africa, many other chemical exposures remain poorly investigated. To advance the field and establish an effective prevention agenda for NCDs caused or exacerbated by chemical exposures, systematic biomonitoring of chemicals - beyond Europe and the United States - along with extensive global collaboration and a stronger focus on complex exposure mixtures, is urgently needed.

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Rethinking African Employees Health and Wellbeing in the New World of Work

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Abstract:

The new world of work has fast expanded beyond our collective expectation, bringing fundamental shift in how, where and when work is done. This is fast shifting tasks from hands to cognitive functions and at the background of this, is technology.

Lately, Internet of Things, Artificial Intelligence, Remote working, Outsourcing, Reskilling and more have become very critical elements reshaping workplaces, work pace and employment patterns with strong potentials to utter employees' behaviour and health outcomes. While these fast increase productivity, profitability and global competitiveness, these gains are achieved at the expense of employees' health and wellbeing, which includes mental health as a very important indicator.

Conditions such as anxiety disorder from burnout and workload, lone worker syndrome from remote working and depression have been heightened by the new work processes. Constant use of technological tools at work has also greatly fueled sedentary behaviour leading to obesity, Type 2 diabetes and other forms of cardiovascular diseases among workers.

The gig economy and outsourcing have flourished greatly in the new world of work with traditional employment contracts affected by the new workplace management systems, taking away the social safety net which serves as a shield for workers. Heightened job insecurity, absence of health insurance and other forms of workers compensation policies are becoming some of the challenges militating against the health and wellbeing of workers.

There is an urgent call to governments at all levels to understand the enormity of the problem and by this, create awareness across the tripartite and also finetune existing legislation which includes legal instruments for regulating digital workplaces.

Keywords: Technology, Health, Wellbeing, Workplaces, Employees

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Environment and Health in Ethiopia: Strengths, Challenges, and the Role of Sentinel and Human Biomonitoring

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Abstract:

Ethiopia is at a critical stage in public health. While the nation has achieved significant milestones, including major success in meeting Millennium Development Goals and reducing maternal mortality, its health system is simultaneously under intense pressure. This pressure comes from a persistent high burden of communicable diseases alongside a rapidly rising trend in non-communicable illnesses, compounded by vulnerability to external factors like conflict and severe climate shocks.

The country faces five major environmental health challenges driven by climate change and industrial expansion. First, as one of the world's most vulnerable nations to climate change, Ethiopia is repeatedly hit by extreme events like severe droughts and devastating floods, which directly impact health, causing malnutrition, food insecurity, and outbreaks of waterborne diseases. Second, the population endures a dual burden of air pollution: Household Air Pollution (HAP) from solid fuels in inefficient cookstoves is the single largest environmental health risk, but Ambient Air Pollution (AAP) from transport and industry also causes tens of thousands of premature deaths annually. Third, persistent gaps in Water, Sanitation, and Hygiene (WASH) infrastructure are a primary driver of waterborne illnesses, a risk critically worsened during flood events. Fourth, agricultural intensification, notably in sectors like the cut-flower industry, has led to increased pesticide use, often involving unsafe farm practices, poor protective equipment, and the reported continued use of banned chemicals on food crops. Finally, the rise of heavy metal pollution is a concern due to unregulated industrial growth, uncontrolled disposal of industrial and electronic waste, and natural geological factors that expose populations to arsenic and fluoride in the Rift Valley.

These technical challenges are magnified by systemic failures, particularly a severe shortage of skilled personnel like toxicologists and the lack of integrated, robust environmental data systems needed to inform evidence-based policy.

To address this, the implementation of a combined Sentinel and Human Biomonitoring (HBM) approach is crucial. This method offers a cost-effective "early warning" system, especially valuable in resource-limited settings. Ethiopia already has a strong model to build upon with its successful national surveillance system for Antimicrobial Resistance (AMR). However, a critical gap exists in monitoring non-infectious environmental hazards.

Human Biomonitoring is necessary to fill this gap because it shifts the focus from measuring what is present in the environment to assessing what has actually entered the human body. HBM measures the internal dose via biomarkers, which is essential for establishing background exposure baselines in a rapidly industrializing country, confirming environmental surveillance signals, and generating the hard scientific proof required to drive public health interventions and regulations. The necessity of HBM was demonstrated by a pilot study in the Rift Valley that confirmed widespread exposure to high levels of arsenic and fluoride, the latter correlating strongly with a high prevalence of severe dental fluorosis in children, and also detected toxic metals entering the food chain via irrigated vegetables.

Although HBM is currently virtually absent from the nation's public health system, the country possesses political will, proven surveillance models, and active international partnerships to succeed. The recommended path forward involves three key actions: investing in people by establishing specialized university programs for environmental health and toxicology; centralizing and scaling up efforts by creating a national HBM program based on the success of the AMR model; and fostering strong collaboration between researchers, international partners, and policymakers to ensure data translates directly into regulatory action. Ultimately, for Ethiopia and its peer low- and middle-income nations, a combined sentinel and HBM approach is not a luxury, but a necessity for securing a sustainable and healthy future.

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Digital Technologies as Enablers of One Health: Evidence and Perspectives from the MENA Region

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Abstract:

The One Health approach recognizes the deep interconnections between human, animal, and environmental health, which are increasingly strained by climate change, biodiversity loss, and the growing threat of zoonotic diseases. The Middle East and North Africa (MENA) region faces heightened vulnerability to these challenges, while simultaneously experiencing rapid digital transformation.

This work advances the concept of One Digital Health (ODH) as an extension of the classical One Health framework, positioning digital technologies as a fourth integrative pillar that enables coordination, surveillance, and decision-making across sectors. Digital tools, such as artificial intelligence (AI), Internet of Things (IoT), geographic information systems (GIS), telemedicine, and interoperable health information systems, are operationalizing One Health across MENA countries. Drawing on a comparative analysis of national digital One Health initiatives across the MENA region, case studies illustrate diverse implementations, including smart agriculture and precision irrigation in Algeria, GIS-based pollution–disease risk mapping and virtual hospitals in Egypt, comprehensive environmental monitoring platforms in the Gulf region, smart city and AI-driven health ecosystems in Saudi Arabia, Qatar, and the UAE, and biodiversity-centered zoonotic surveillance systems such as ZODIAC and SISE in Morocco. The analysis further highlights the growing importance of One Health Genomics, demonstrating how the integration of nuclear, mitochondrial, viral, and microbiome data can enhance early warning systems, biosurveillance, and pandemic preparedness. Despite notable progress, significant barriers persist, including fragmented governance, limited interoperability, uneven digital maturity, and insufficient evaluation frameworks.

Advancing One Digital Health in the MENA region requires harmonized data standards, federated digital platforms, strong cross-sector governance, and sustained capacity-building. Such efforts are essential to strengthen regional resilience and contribute meaningfully to global health security.

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Setting up an infrastructural landscape and opening an access to services for human exposome research

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Abstract:

The human exposome, defined as the totality of non-genetic exposures experienced across the life course, is widely recognized as the missing link needed to explain the large fraction of disease variance that genetics alone does not capture. Operationalizing exposomics requires an integrated, multi-scale infrastructural landscape that combines population studies, long-term monitoring, high-throughput chemical and biological profiling, data platforms, and governance frameworks.

We propose a systems' blueprint for enabling access to services and capacity for human exposome research. The presentation synthesizes (1) the strategic role of pan-European research infrastructures, such as EIRENE RI in coordinating exposure science and open access services; (2) contributions of the European framework projects and partnerships such as IHEN, EHEN or PARC to building international exposome networks and necessary capacities; (3) the practical assets available today through national/regional RIs, similar to RECETOX RI, focusing on analytical cores, biobanking, and open-access user services, and how these can plug into larger networks; and (4) exemplar components, like the CELSPAC population cohorts and MONET-style monitoring networks, as building blocks for linked exposure-outcome pipelines.

The recommended landscape has five interoperable layers (as piloted in the RECETOX RI): (A) distributed environmental monitoring efforts (air, water, soil) such as MONET); (B) harmonized longitudinal population cohorts and biobanks, as the CELSPAC model for birth-to-ageing life-course sampling; (C) centralized analytical cores and reference libraries - EIRENE exposomics capacities - offering high-resolution mass spectrometry, omics, and standardized QA/QC; (D) federated data platforms and governance, as materializes in the IHEN vision for an International Human Exposome Network to coordinate standards, training, and FAIR data); and (E) translation and stakeholder interfaces (research, policy, industry, and social-innovation projects) such as SIRENE to promote research for community uptake).

Cross-disciplinary integration between genomics and exposomics is essential, as combining genome-scale data with exposome profiles will enable gene x environment discovery at population scale and improve causal inference. Coordinating initiatives, like the EIRENE and IHEN in Europe, NEXUS in the US, Moonshot forum and Global Exposome Forum provide the convening mechanisms required to align methods, share reference resources, and catalyze Human Exposome Project.

In conclusion, building an operational exposome infrastructure is feasible today by federating existing RIs, cohort assets, monitoring networks, and global coordination. Strategic investments in standardized analytics, interoperable data platforms, ethics-aware governance, and regular global fora will accelerate discovery and translation toward prevention of environmentally mediated diseases.

Keywords: human exposome, exposomics, research infrastructure, EIRENE, IHEN, PARC, NEXUS, Global Exposome Forum, FAIR data, harmonization, cohorts, genomics, RECETOX, CELSPAC, MONET, GENASIS.

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The BIONET Network : A Euro-African Initiative for Occupational surveillance and Environmental Health

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Abstract:

Rapid industrialization, agricultural intensification, and urban expansion across Africa are increasing occupational and environmental exposures, while health surveillance systems remain fragmented, under-resourced, and poorly harmonized across countries. The BioNet network is established as a Euro-African collaborative platform to strengthen occupational and environmental health surveillance through integrating advanced exposure assessment, promoting and standardizing human biomonitoring, promoting a precision exposome approach and harmonizing health outcome data across diverse African settings.

BioNet brings together universities, research institutes, public health departments, and civil society actors to co-develop standardized protocols for exposure characterization, including chemical, physical, biological, and social determinants across the life course. By supporting infrastructure development, building local research capacities, and embedding exposomics, human biomonitoring, multi-omics biomarkers, and contextual data, BioNet aims to generate high-resolution evidence on exposure-disease pathways relevant to African workplaces and communities. Our common methodological framework is deliberately aligned with equity and implementation considerations. The Network promotes the use of non-invasive and minimally invasive sampling and self-collection protocols, hence enhancing ethical acceptability, participant autonomy, and inclusiveness, while facilitating deployment in resource-constrained environments.

The network's theory of change assumes that harmonized data generation, capacity building, and South-South-North collaborations will enable earlier detection of emerging risks, promote institutional readiness for surveillance, support evidence-based prevention strategies, and inform policies aligned with sustainable development and climate resilience. Emphasis is placed on data FAIRness, ethical governance, and alignment with international standards. Ultimately, the Network seeks to transform fragmented surveillance efforts into a sustainable, interoperable system that advances health protection, environmental justice, and resilience across Africa.

Keywords : Network, Sentinel surveillance, Occupational health, Environmental health, Precision exposome, Africa.

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Oral Presentation Abstracts

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Occupational and Environmental Exposure to Cytostatic Drugs and Health Effects in Morocco

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Abstract:

Cytostatic or antineoplastic drugs are mainly used in chemotherapy for cancer treatment. The daily use of cytostatic drugs by healthcare professionals might expose them to several health risks. Our study aims to monitor occupational and environmental exposure to cytostatic drugs among health care workers and predict its health risks.

We first launched in Morocco an online survey to assess knowledge and practices related to the use of personal protective equipment (PPE) among health professionals. Then, we conducted a pilot cross-sectional study among 69 health workers to identify methods for exposure evaluation and to quantitatively evaluate the exposure to cytostatics. Wipes sampling is taken from surfaces, objects and PPEs, and combined with dermal sampling from health care workers, to be analyzed by high performance liquid chromatography coupled with a mass spectrometer. Human biomonitoring focuses on the investigation of cytostatics excreted in urine. Neurotoxicological and epigenetic biomarkers are assessed and correlated to cytostatics concentrations. The results show that 20.8% of healthcare professionals regularly use personal protective equipment. 82% report being exposed to cytostatic drugs at least once a week, and 72.7% of them are not trained in the safe handling of these drugs. Additionally, 43.6% report being less aware of the health risks associated with cytostatic agents.

The results should highlight the risks of unintentional exposure to cytostatic drugs in occupational settings and pave the way for a larger-scale study to confirm our preliminary findings.

Keywords: Cytostatic drugs, Occupational exposure, Personal protective equipment, Contamination, Healthcare professionals

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Human Biomonitoring studies in Ethiopia: case studies, challenges and opportunities

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Abstract:

Ethiopia is currently undergoing rapid industrialization marked by new industrial parks, mines, and commercial farms, drawing many workers from agriculture. These workers often enter the industrial sector with minimal training and inadequate safety systems, leading to widespread exposure to workplace hazards. Nevertheless, the surveillance of occupational health is still nonmandatory, and the level of workers' chemical and biological exposures is not documented on any scale. This study was conducted to determine the different aspects of the exposures and the levels of the workers' self-assessed health symptoms within the two major regions of Ethiopia. A cross-sectional study design was employed. A total of 1,500 workers were surveyed: 750 in industrial settings in Hawassa (welding, carpentry, mechanics) and 750 in health care and technical services in Jimma (hospitals, laboratories, biomedical engineers). The data were gathered using comprehensive questionnaires. The lists of exposures were grouped into seven categories: heavy metals, Volatile Organic Compounds (VOCs), aromatic hydrocarbons, gases, fumes, biological materials, and cytotoxic agents.

The industrial group (Hawassa) comprised mostly of males, of whom 79.5% had higher perception of environmental pollution. Healthcare professionals (Jimma) had higher prevalence of chemical exposure in general, VOCs being more prevalent. Chronic exposure (>10 hours/week) to gases, fumes, and VOCs was prevalent in both groups. Exposure to heavy metals such as lead and mercury was prevalent in technical and clinical specialties. Serious deficiencies existed in medical screening, whereby there were no forced visits for occupational health consultation. Personal protective equipment was also deficient, notably in health services, whereby sophisticated protection for high-risk exposure to substances like cytotoxic drugs or infectious fluids was absent. Symptoms of health effects differed among groups: Industrial had higher proportion of headaches (61.1%) and dizziness (28.5%), while health professionals had higher proportion of various acute health effects. The key challenges include the lack of biomonitoring in the population, insufficient analysis capacity, reliance on self-reporting, lack of engineering controls (such as local exhaust ventilation), and failures in personal protective equipment infrastructure and occupational health surveillance.

This work draws attention to the grave occupational health risks facing the Ethiopian population, especially health sector employees, industrial workers, and cleansing personnel. It is imperative that there is a focus on the provision of PPE directly addressing the hazards they are exposed to, and there should be biological follow-up. It is essential that there be a shift in the methodological approach by transitioning into longitudinal study designs and biological validation samples.

Keywords: biomonitoring, occupational exposure, Ethiopia, health care, industrial hazards, PPE, medical surveillance, VOCs, heavy metals

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Human Sentinel Surveillance Platform (HSSP) for comprehensive exposure assessment in occupational and environmental health

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Abstract:

Nowadays, environmental and occupational exposures are threatening the health of a wide range of workers as well as the general population, contributing to the rising burden of chronic diseases and adverse health conditions. Traditional surveillance systems have helped tracking many hazards and diseases. Yet, they are not often relevant or effective to capture complex exposures across diverse settings.

Therefore, the Human Sentinel Surveillance Platform (HSSP) has been developed as a novel tool to monitor exposures and health effects in real-time, by the inclusion and active participation of trained and motivated health professionals, with the global aim to identify emerging exposure trends. Through this work, we define the foundational pillars, data governance principles, and operational workflows of the HSSP, while critically examining its potential impact on health policy, practice, and exposome research. For relevant data collection, the platform has followed a centralized methodology and has the capacity to integrate biomarker-based monitoring, validated questionnaires, and adaptive protocols that can be updated in response to new threats.

By incorporating multidisciplinary data from epidemiology, toxicology, genetics, and exposure science, HSSP enables comprehensive exposure characterization, longitudinal analysis of exposure-health relationships, early warning and timely public health regulatory and preventive interventions. This scalable and adaptable platform bridges critical data gaps in exposome research by capturing dynamic human-environment interactions and generating actionable insights to inform targeted interventions and provide evidence-based foundations for public health policy.

Keywords: Sentinel surveillance, Platform, HSSP, Monitoring, Occupational Health

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Toluene Flanders Exposome Project: Exposure assessment in working population via Human Sentinel Surveillance Platform (HSSP)

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Abstract:

The *Toluene Flanders Exposome Pilot* explores the feasibility of monitoring occupational toluene exposure in the Flemish workforce using the Human Sentinel Surveillance Platform (HSSP), a digital tool supported by a network of Belgian occupational physicians and nurses.
Between November 2024 and December 2025, Belgian occupational physicians and nurses are enrolling industrial employees who may encounter toluene during routine medical examinations in IDEWE centers. To date, 10 Occupational health professionals and 25 employees are included. Each worker provides a spot-urine sample for quantification of o-cresol, a specific metabolite of toluene, and completes a web-based survey capturing demographics, medical history, lifestyle factors, job tasks, frequency and duration of toluene use, protective measures, and self-reported health effects.
Preliminary results provide exploratory insights into internal toluene exposure levels and associated work-related factors. The paired dataset will enable (i) descriptive mapping of internal toluene burdens across industrial sectors, job titles and exposure scenarios; (ii) exploration of urinary o-cresol levels and self-reported acute and chronic symptoms; and (iii) assessment of modulating factors such as smoking, alcohol use and personal or collective protective equipment. The project offers critical proof-of-concept data that will support the refinement of HSSP procedures and inform the development of future large-scale occupational biomonitoring studies, ultimately contributing to improved surveillance and prevention strategies for chemical exposures in the workplace.

Keywords: Sentinel surveillance, Toluene, Occupational health, human biomonitoring.

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Contrasting sources of dietary intake of cobalt and lead in the mining region of Katanga, DR Congo: a duplicate meal study

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Abstract:

We investigated the dietary intake of trace metals, with a focus on cobalt (Co) and lead (Pb), and its link with concentrations found in collected surface dust and urine obtained from people living in areas with contrasting degrees of mining-related pollution in Lubumbashi. Duplicate meals were obtained from 120 participants (52 households) and 51 participants (38 households) in the dry season (DS) and rainy season (RS), respectively; 89 (DS) and 38 (RS) participants lived close (<1km) to mining activities s [contaminated areas (CAs)] and 31 (DS) and 13 (RS) participants lived far from mining [reference areas (RAs)]. Trace metals were measured by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS) in food, surface dust and urine.

In both seasons, geometric mean (GM) concentrations of Co in food and urine were twice higher in CAs than in RAs, whereas Pb concentrations in food were unaffected by area. Dust and food concentrations correlated for Co but not for Pb. The higest estimated daily intake values of Co were found in the CAs, and children had higher GM than adults. Daily intake of Pb exceeded the US FDA interim reference levels in 95% of children and 90% of adults. The concentrations of Co in food and urine were consistent with the amounts of Co found in dust, which depended on proximity to mining activities. However, the patterns of Pb concentrations in food did not parallel those found for Co, thus suggesting that food contamination by Pb originates from sources beyond local mining-related activities.

Keywords: Lead, Dust, Food, Daily intake

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Occupational Medicine in Morocco: A Monitoring Tool for a Sustainable Ecosystem

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Abstract:

Occupational medicine in Morocco is a medical specialty focused on the prevention of occupational risks. The concept of occupational health as a whole has evolved through several stages, from corporate healthcare to a genuine approach to the prevention of workplace accidents and occupational diseases.The objective of this study is to highlight the true role of the occupational physician in improving the overall ecosystem within the company, in the workplace and in its interaction with the environment, both inside and outside the company.

This study is based on historical elements of the evolution of occupational medicine within Moroccan society, as well as current legal, regulatory and normative requirements. Our work is based on an opinion from the CESE (Economic, Social and Environmental Council) providing an overview of occupational medicine practices (number of occupational physicians, types of practice, etc.) and recommendations, as well as on the national occupational health and safety profile in Morocco. A socio-economic and environmental study examines trends in the evolution of new occupational risks in Morocco.

Recommendations are made on occupational medicine monitoring methods, concerning the training of occupational physicians, which must evolve to keep pace with Morocco's socioeconomic development in view of the political, sporting and environmental challenges it faces.

This work highlights the place of occupational medicine in this ecosystem, as well as the requirements associated with the evolution of occupational risks in a constantly changing economic and industrial world.

Keywords : Occupational Medicine, sustainable development, ecosystem, environment

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Evaluation of Farmers' Knowledge of Pictograms on Pesticide Products in Cotonou and Grand-Popo (Southern Benin)

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Abstract:

Agriculture is the backbone of Sub-Saharan African economies. In Benin, market gardening, a key branch of urban and peri-urban agriculture, contributes significantly to national food sovereignty. However, pest pressure leads farmers to rely heavily on pesticides, exposing them to health and environmental risks. This study aimed to assess farmers' knowledge of pictograms displayed on pesticide labels in Cotonou and Grand-Popo (Southern Benin). A cross-sectional descriptive and analytical survey was conducted from May 2 to August 5, 2022, using a structured questionnaire and participant observation. Data were analyzed with R software (Chi-square, ANOVA, logistic regression). Most respondents were men (92%), with a mean age of 48 years. Pesticide-related symptoms were frequently reported: eye irritation (24%), skin irritation (15%), nausea (11%), and dizziness (5%). Notably, 37% of farmers declared that they did not pay attention to labels before pesticide use. While 71% correctly identified the meaning of pictograms, knowledge of color codes was particularly poor, with incorrect answers for red (82%), yellow (83%), blue (86%), and green (87%). Logistic regression showed that more experienced farmers reported fewer symptoms, highlighting the protective effect of practical knowledge. Paradoxically, the use of personal protective equipment (PPE) was associated with higher health expenditures, possibly reflecting cumulative exposure or reporting bias. These findings reveal that although a majority of farmers recognize pesticide pictograms, their overall understanding of label information remains insufficient. Strengthening training and awareness-raising programs is urgently needed to improve safe pesticide handling, promote effective use of protective equipment, and reduce health risks among farmers in Benin.

Keywords: health risks, pesticides, pictograms, market gardeners, Benin

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The LëtzHBM survey: Generating Comparable Biomonitoring Data Across Europe

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Abstract:

The LëtzHBM survey is Luxembourg's contribution to the biomonitoring programs on the general population across 25 European countries, as part of the European Partnership for Chemical Risk Assessment (PARC). Its objectives are to collect human biomonitoring (HBM) and indoor environmental data on chemical exposure that are comparable across the participating countries.

Harmonised protocols and rigorous quality control procedures ensure this comparability. Based on the data collected, reference values will be calculated, exposure determinants and sources of exposure identified, and associations between external and internal chemical exposures and early health effects investigated. In Luxembourg, a stratified sampling strategy is applied to recruit 300 children and 300 adults from different geographic regions, ensuring national representativeness. Additional representativeness is considered with respect to age, sex, and seasonal variation. Data collection (2025-2027) includes: (i) administration of standardised questionnaires, (ii) collection of biological samples (blood, urine, hair), and (iii) collection of indoor environmental samples (dust, air, tap water). These samples are analysed in accredited laboratories to determine concentrations of selected priority chemicals.

The findings will contribute to national and EU-pooled datasets, inform risk assessors and policy-makers, and provide reference values for future environmental health monitoring programs in Luxembourg and across Europe.

Keywords: Human Biomonitoring, Indoor environment, Chemical exposure, Harmonization

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Between absence of occupational exposure and environmental pollution: Blood chromium as a reference indicator in Morocco

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Abstract:

The leather tanning process is well known for its intensive use of chemicals which pose serious problems for human health and the environment. The objective of this study was to evaluate blood chromium levels in traditional tanners in comparison with non-exposed individuals from the general population of Fez. The environmental consequences of the use of chemicals in the traditional tanning sector were also assessed.

Human Blood samples from 220 tannery workers (at Chouara, Sidi Moussa, Ain Azleten) and 220 age-matched referents were collected and analyzed for total blood chromium content using inductively coupled plasma mass spectrometry (ICP-MS). Simultaneously, the characterization of the water discharged from four pits: liming, deliming, tanning and final effluent of the Chouara tannery was carried out in order to determine their chemical load.

The findings showed that the concentrations of total chromium in blood samples from tannery workers were ranged between 0.50 to 6.14 µg/L compared to controls (0.50 to 8.01 µg/L). The percentage of detection of chromium in the blood was lower in the tanners compared to the controls (4.1% vs. 24.5%). In addition, the results of the tanning discharge characterization show a very low chromium concentration (0.0984mg/l), but typically contains a complex mixture of organic and inorganic polluants with high values of turbidity, BOD5, COD and some metallic elements (Al, Na, Mg, Ca). This constitutes a real threat to health and the environment.

Our study did not reveal significant occupational to chromium among tannery workers. These findings suggest that even in the absence of direct chromium exposure, other occupational or environmental factors may be contributing to these numerous illnesses, including respiratory, dermatological, and ocular disorders. The study also contributes baseline data on blood chromium levels in the Moroccan population.

Keywords: traditional tannery, health risk, chromium, working conditions, environment.

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FAIREHR: A Novel Registry Platform for digitalization of Environmental Health Research for Sustainable change

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Abstract:

Human biomonitoring studies generate high-value, ethically sensitive exposure and health data, yet these datasets are often fragmented, poorly documented, and difficult to access or integrate across studies.

The Findable, Accessible, Interoperable, Reusable Environment and Health Registry (FAIREHR) is a state-of-the-art online registry platform designed to enhance the transparency, reproducibility, and comparability of environment and health research, focusing on human biomonitoring (HBM) studies as a starting point. This platform is developed in response to the Europe Regional Chapter of the International Society of Exposure Science (ISES Europe) HBM working group strategic objectives to generate high quality HBM studies by harmonizing the HBM data life cycle and implementing FAIR guiding principles. The registry enables preregistration of studies, capturing key metadata on study design, data management, and planned methods before recruitment of the participants.

FAIREHR is the first registry tailored for HBM studies and is also the first registry promoting FAIR by design studies. Impacts of FAIREHR include increased research visibility, improvements of data comparability, enhanced collaboration, and better-informed decision-making.

Keywords: FAIREHR, Platform, digitalization, HBM, environmental health

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Clinical Risk Profiling Associated with Mercury Exposure in Moroccan Dentists: Insights from Symptom Clustering and Occupational Risk Mapping

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Abstract:

Dental amalgam remains a source of chronic low-dose mercury exposure in dental practice. In Morocco, the absence of standardized clinical surveillance tools hinders the early identification of adverse health effects among dental professionals. A dual focus on symptomatology and occupational exposure conditions is necessary to guide prevention. This work combines two complementary investigations carried out among Moroccan dentists: (1) a latent class regression to identify symptom-based risk profiles; and (2) a multidimensional analysis of occupational risk conditions including workplace characteristics, professional habits, and individual protection measures. The findings served as a basis for the preliminary development of a clinical surveillance questionnaire.

A structured cross-sectional survey was conducted among 192 liberal dentists. Latent class analysis of self-reported symptoms revealed two distinct subgroups, with the higher-risk class showing elevated frequencies of some evocating symptoms like fingers' tremors (65%), chronic fatigue (49%), sleep disturbances (56%), anxiety (51%), and lack of movement coordination (21%). In parallel, multidimensional and cluster analyses identified high-risk exposure contexts involving e.g. frequent amalgam use, manual alloy-mercury mixing, open waste containers, insufficient ventilation, and inadequate workplace equipment.

Membership in the high-risk symptom class was associated with occupational exposure intensity and poor preventive practices. These findings informed the draft of a preliminary surveillance questionnaire, integrating both clinical symptoms and modifiable exposure risk factors. The tool is intended for conceptual use and has not yet undergone validation.

This dual analytic approach contributes to a first step toward structured surveillance of mercuryrelated risk among dentists. The proposed questionnaire, grounded in observed symptom clusters and contextual risk factors, is exploratory and requires formal validation for clinical or occupational use.

Keywords: Mercury exposure, dental amalgam, dentists, Morocco, occupational risk, symptom clustering, individual protection, surveillance questionnaire

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Occupational Exposure to BTEX Among Gas Station Attendants and Traffic Police in Meknes, Morocco: A Four-Month Environmental and Biomonitoring Study

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Abstract:

Volatile aromatic compounds of the BTEX group (benzene, toluene, ethylbenzene, and xylenes) are atmospheric pollutants mainly originating from fuel refueling and road traffic. Chronic inhalation of these substances poses a major risk to human health due to their hematotoxic, neurotoxic, and carcinogenic effects. The aim of this study, to be conducted in the city of Meknes over a four-month period, is to assess occupational exposure to BTEX among two particularly vulnerable groups of workers: gas station attendants and traffic police officers. These exposure levels will then be compared to those of a control group representing the general population, in order to highlight the occupational over-risk associated with these professions.

The methodology will be based on two main components: Environmental monitoring: ambient air sampling using BTEX-specific passive samplers and manual counting of road traffic density. Biomonitoring: collection and analysis of urine samples to quantify specific biomarkers (Trans muconic acid and S-phenylmercapturic acid for benzene; hippuric acid for toluene; mandelic acid and phenylglyoxylic acid for ethylbenzene and styrene; methylhippuric acid for xylenes). The expected results will make it possible to: (i) compare exposure levels between gas station attendants, police officers, and the general population; (ii) establish correlations between atmospheric concentrations and urinary biomarkers; and (iii) better document the health risks associated with occupational and environmental exposures.

This study should contribute to improving knowledge on the impact of BTEX on the health of exposed workers and the urban population of Meknes, and to guiding the implementation of appropriate preventive and monitoring measures.

Keywords: BTEX, occupational exposure, biomonitoring, Meknes, occupational health

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Occupational constraints and risks associated with traditional medicine in rural settings: endogenous treatment of immunoallergic dermatoses in Benin

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Abstract:

The promotion and use of endogenous knowledge for the treatment of immunoallergic dermatoses (IAD) suffers from a lack of scientific evidence. It exposes traditional healers and users to environmental and poisoning risks. The present study analyzes the constraints and exposure risks faced by traditional healers in the treatment of IAD in the municipality of Tchaourou in northern Benin. Semi-structured interviews made it possible to collect focus group data from traditional healers on the conditions for admitting and treating IAD patients, the level of interaction between traditional and modern medicine, the risks incurred during treatment, and the measures used to limit these risks. Individual interviews were conducted using a digitized questionnaire with holders of knowledge on IAD treatment regarding their practices. The types of IAD treated include pruritus (61.3%), urticaria (31.3%), eczema (5%), cutaneous lichen (2.5%), and toxidermia (3.8%). Treatment spaces are mostly the homes of traditional healers. Work equipment and protective gear for traditional healers are almost nonexistent. The various risks identified include contamination of healers or their immediate family; snake bites and various injuries related to the collection of medicinal plants in floral areas; high variability in doses and plant constituents; lack of mastery of the phytochemical composition of plants; absence of toxicity analyses; occupational stress; risks of imprisonment linked to errors and possible patient deaths during treatment; and poor knowledge of the legal and regulatory framework governing traditional medicine. Consultation of the Fa by traditional healers is a strategy for limiting and anticipating risks related to IAD treatment. Analysis of plant morphology is a socio-endogenous technique used to infer plant dosage and toxicity. The use of traditional medicine for the treatment of IAD presents varied risks, even though it represents the most widely used treatment method. As with modern medicine, it is essential to identify pathways for risk management related to the promotion and sustainability of traditional medicine in Benin.

Keywords: Protection, risks, traditional healers, traditional medicine

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GSH/GSSG as a potential effect biomarker for risk assessment of workers exposed to real-life mixtures

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Abstract:

Glutathione ratio (GSH/GSSG) plays a crucial role in different detoxification pathways and regulation of oxidative stress. Exposure to metals and volatile organic compounds (VOCs) has shown to disrupt this balance, potentially triggering future adverse health effects. In this study, we evaluated the ratio of GSH/GSSG concentrations as a potential tool for risk assessment of workers exposed to complex mixtures.

Workers from mines and solvent production industries (n=184), along with control participants (n=62), were recruited in Romania. Metal exposure and the GSH/GSSG ratio were assessed in blood samples, VOCs were measured in urine after work shifts. All analyses were performed using validated liquid chromatography–tandem mass spectrometry (LCMS/MS) methods. Participant characteristics (workers vs. controls) were compared. Correlations between the different chemical exposures were evaluated using Spearman correlation. Associations between individual exposures and the GSH/GSSG ratio were examined using linear regression models, while the combined effect of the mixture was assessed using Weighted Quantile Sum (WQS) regression. Models were adjusted for sex, age, smoking status, and years of employment. Due to inherent differences and potential different exposure routes in workers vs. controls, the analyses were repeated in both groups separately.

Workers showed higher concentrations of Pb, Cd, and SPMA compared to controls. However, the median concentrations remained below the Biological Guidance Value (BGV), when such values were available. Among workers, Cd (µg/L, -85.44, 95% CI: -174.95, -4.05) and Hg (µg/L, -190.71, 95% CI: -313.31, -68.12) showed negative associations with the GSH/GSSG ratio, as well as the WQS mixture index (-137.89, 95% CI: -256.40, -19.39). No associations were identified in the control group or in the full group.

These findings suggest that occupational exposures may have a stronger impact on oxidative stress. However, additional data from workers with higher levels of occupational exposure are needed to better capture a health risk and to develop an effective tool for risk assessment.

Keywords: Occupational health, Toxic metals, Volatile organic compounds (VOCs), glutathione (GSH)

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The role of the nutrient sensor complex, TORC1, in regulating insulin production or secretion

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Abstract:

Defective regulation of insulin production or secretion is a hallmark of diabetes, a major global health concern with rising incidence and severe socio-economic impacts. The nutrient sensor complex TORC1 and its downstream target ribosomal S6 kinase (S6K) have been implicated in insulin secretion regulation in both humans and the nematode Caenorhabditis elegans. However, the molecular mechanisms underlying this regulation remain poorly understood. Leveraging the genetic tractability of C. elegans, this project aims to identify and characterize direct targets of TORC1 and S6K involved in insulin signaling. Using CRISPR/Cas9- mediated genome editing, combined with phenotypic, biochemical, and imaging analyses, we investigate the impact of candidate gene disruption on insulin production and secretion. Phosphoproteomics analyses of TORC1 and S6K mutant worms revealed 48 phosphoproteins with altered phosphorylation patterns. From these, we will select the most promising candidates, based on predicted functional relevance and conservation, to generate targeted knockout strains. This approach will enable us to dissect the signaling pathways linking nutrient sensing to insulin secretion, providing novel insights into fundamental metabolic regulation with direct relevance to human diabetes research.

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Burnout in Moroccan University: A Preliminary Study at the Faculty of Sciences of Meknès

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Abstract:

Public higher education is a key driver of national development, yet it faces numerous structural and human challenges. Academic and administrative staff are under growing pressure due to the constant increase in student enrollment, the massive wave of retirements, and the rapid evolution of pedagogical and organizational demands. In this context, working conditions may significantly affect mental health, particularly through the emergence of chronic stress and burnout syndrome. This study aims to explore the prevalence and associated factors of academic burnout among staff members at the Faculty of Sciences of Meknes (FSM). We conducted a cross-sectional observational study targeting faculty members, researchers, and administrative personnel at FSM. Eligible participants had to be employed for at least six months and give explicit verbal consent. Individuals on temporary assignments, on leave, or who declined participation were excluded. Data were collected through a structured and anonymous questionnaire developed from a comprehensive literature review. It included two sections: the first on sociodemographic and professional data, and the second assessing burnout via the Maslach Burnout Inventory (MBI). Prior to the full study, a pilot survey was conducted on 40 professors out of 260 and 20 administrative staff out of 80. In the pilot phase, 55% of professors experienced burnout, 15% were in an intermediate state, and 30% were not professionally exhausted. Among administrative staff, 45% had burnout, 28% were in an intermediate state, and 27% were not experiencing burnout. Statistical analysis of the full dataset is ongoing and will be presented in later phases. Public universities cannot achieve sustainable progress without protecting staff well-being. A better understanding of burnout is key to developing prevention and support strategies. Notably, the pilot study indicates a higher prevalence of burnout among professors compared to administrative staff, highlighting the need for interventions.

Keywords: Burnout, Higher Education, FSM, University Staff, Morocco.

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Psychosocial Risks and Mental Health at Work: A Multisectoral Study among Moroccan Workers

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Abstract:

Psychosocial risks (PSRs) represent a growing occupational health concern worldwide. While international studies have established their impact on workers' mental health, empirical evidence from North Africa, and Morocco in particular, remains limited. Understanding sector-specific vulnerabilities is critical to developing effective prevention strategies. This study assessed the impact of PSRs on well-being among Moroccan workers across multiple sectors and explored organizational variables that may act as risk or protective factors.

A cross-sectional survey was conducted among 350 workers from seven economic sectors in Morocco during the period between January 2024 and March 2025. Data were collected through standardized questionnaires covering well-being at work, psychological distress, organizational climate, organizational justice, optimism, and satisfaction of basic needs. Statistical analyses included t-tests, ANOVA, Kruskal–Wallis tests, and Spearman correlations. Scale reliability was verified with Cronbach's alpha coefficients.

Results showed that economic and occupational variables, particularly income, sector, and employment status, were significantly associated with psychological distress ($p < 0.001$). Workers in education, healthcare, and construction reported the highest levels of vulnerability. In contrast, organizational justice, a positive workplace climate, and the satisfaction of basic psychological needs were strongly correlated with well-being ($\rho > 0.5$). Individual characteristics such as age and gender did not have significant effects in our population.

These findings underscore that organizational factors weigh more heavily on mental health than personal characteristics. They highlight the need for sector-sensitive prevention policies to address psychosocial risks in Morocco. This work provides a foundation for evidence-based interventions and points to the importance of longitudinal and biomarker-based approaches to better capture stress dynamics in the workplace.

Keywords : psychosocial risks, mental health, workplace well-being, Morocco.

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The relationship between emotional intelligence and burnout among mental health nurses in Morocco

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Abstract:

This descriptive and correlational study was conducted to investigate the relationship between emotional intelligence (EI) levels and burnout in mental health nurses. The study sample comprised 112 nurses from three psychiatric hospitals in the Tangier-TetouanAl Hoceima regional health authority. Data were collected using the Personal Information Questionnaire, the Wong and Law EI Scale, and the Maslach Burnout Inventory. Data were analyzed using Student's t-test, Kruskal Wallis test, Pearson's correlation, and linear regression analysis.

The nurses' mean EI score was 27.61±6.5, while the mean burnout score was 24.06±7.3. A significant negative relationship was observed between burnout and EI scores ($r=-0.352$; $p<0.05$). In addition, a statistically significant difference was observed between demographic characteristics, including gender and marital status, and EI and burnout scores ($p<0.05$). Multiple regression analysis showed that three factors statistically significantly predicted burnout in nurses in the final regression model. These were gender ($\beta=0.466$, $p<0.05$). However, total EI score was a significant negative predictor ($\beta=-0.454$, $p<0.05$).

EI has a strong influence on burnout. EI training programs should, therefore, be implemented to prevent and reduce the risk of burnout among mental health nurses.

Keywords : Burnout, emotional intelligence, mental health nurses, Morocco

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Burnout Under Pressure: What Predicts Mental Exhaustion Among Public Health Workers in Southern Morocco (Drâa-Tafilalet region)

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Abstract:

Burnout Syndrome (BOS) refers to a state of physical, emotional, and mental exhaustion resulting from prolonged exposure to high-stress work environments. It can significantly compromise an individual's professional functioning, sometimes with long-lasting effects.

The study population includes public health personnel from the provinces of Ouarzazate and Errachidia (N = 1203), located in the Drâa-Tafilalet region. This explanatory and predictive research seeks to identify the key factors associated with Burnout Syndrome (BOS) among these healthcare workers. Given the dichotomous nature of the outcome (present/absent), binary logistic regression (BLR) was employed to investigate potential associations. The strength and accuracy of these associations were evaluated using Odds Ratios (OR), along with their respective 95% Confidence Intervals (CI).

The main common predictive factors of burnout syndrome (BOS) identified in both provinces were professional role and understaffing. Medical staff in Ouarzazate [OR = 27.29, 95% CI: 9.95-35.50, $p < 0.01$] and nursing staff in Errachidia [OR = 11.51, 95% CI: 2.68-80.96, $p < 0.01$] were at significantly higher risk. Working in understaffed units was also associated with increased BOS risk in both Ouarzazate [OR = 15.38, 95% CI: 2.01-223.56, $p < 0.05$] and Errachidia [OR = 3.24, 95% CI: 1.72-6.14, $p < 0.001$]. Conversely, recognition from management emerged as a strong protective factor against BOS in both settings: [OR = 0.02, 95% CI: 0.01-0.19, $p < 0.01$] in Ouarzazate and [OR = 0.16, 95% CI: 0.10-0.26, $p < 0.001$] in Errachidia.

Burnout prevention requires a comprehensive approach that addresses all contributing factors. Prompt and targeted organizational-level actions are essential to effectively support healthcare professionals.

Keywords: Burnout syndrome, public health, risk factors, health staff, Morocco

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Assessment of Well-Being Among Youth in Morocco: A Confirmatory Study among University Students

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Abstract:

Mental health and well-being of higher education students are critical determinants of academic success and socio-economic development. The WISH study (Well-being Investigation among Students in Higher education) was conducted to comprehensively evaluate the mental and social well-being of Moroccan students and identify the demographic and psychological factors that modulate it.

This cross-sectional study involved 3,244 students from 10 Moroccan universities. The survey was conducted during the 2022/2023 academic year using internationally validated scales to measure social and emotional loneliness, life satisfaction, positive affect, negative affect, and general well-being. Statistical analysis established correlations between demographic variables and well-being measures.
The study reveals an alarming prevalence of psychological distress: 77.2% of students report experiencing nervousness, 62.2% experience feelings of sadness, and 73.6% feel exhausted. Particularly concerning, 79.2% report recurrent sleep disturbances, and 74.4% report exam-related anxiety. Analysis of demographic factors reveals distinct patterns: younger students (under 21 years) exhibit higher levels of loneliness (mean score of 3.7 on a 7-point scale) and lower life satisfaction (3.9 on a 7-point scale) compared to older students. Female students report significantly higher negative affect (3.9 on a 7-point scale) than male students (3.5 on a 7- point scale), revealing increased vulnerability to stress factors. Employed students demonstrate higher life satisfaction (4.4 vs. 3.9), increased positive affect (5.7 vs. 5.3), and reduced negative affect compared to non-employed students.

The WISH study highlights the urgency of addressing mental health challenges faced by Moroccan students. Close collaboration among academic institutions, policymakers, and health professionals is essential to create a healthy and inclusive learning environment.

Keywords: Student well-being, Mental health, Academic stress, positive and negative affect, Higher education, Morocco

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Comprehensive environmental monitoring and impact assessment using bioindicators and advanced techniques

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Abstract:

Environmental pollution poses significant risks to both ecosystem health and human well-being, particularly in sensitive or vulnerable areas where exposure to contaminants can impact local populations and biodiversity. This research, driven by environmental awareness, aims to revolutionize environmental monitoring and impact assessment by integrating advanced Earth observation technologies with environmental exposure assessment, proximal sensing, remote sensing, and in situ data collection methods. Proximal sensing delivers high-resolution, detailed data critical for analyzing localized environmental phenomena, while remote sensing expands observational capabilities by providing broad spatial coverage and access to regions that are otherwise difficult or hazardous to monitor. In situ data collection remains indispensable for the verification and validation of findings obtained through both proximal and remote sensing approaches. The combination of these methods facilitates the collection of diverse environmental data, strengthening our capacity to observe, detect, and predict environmental changes across various spatial and temporal scales. This comprehensive approach not only enhances monitoring capabilities but also supports informed decision-making by providing accurate and timely environmental information to all relevant stakeholders As this research advances, special attention will be given to the role of bioindicators in environmental impact assessment. Bioindicators—organisms or biological responses sensitive to environmental contaminants—serve as living measures of ecosystem health. They are essential for evaluating the cumulative impacts of pollutants and habitat alterations, providing early warning signs of environmental degradation. The anticipated outcomes of this research include the development of innovative bioindication methods, enhanced early detection of environmental changes, more cost-effective monitoring strategies, and thorough validation of novel techniques against established approaches. This work underscores the value of interdisciplinary collaboration in advancing environmental science and fostering more responsible management of natural resources.

Keywords: Environmental Monitoring, Proximal Sensing, Remote Sensing, In Situ Data, Bioindicators

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Success factors for health technology assessment of digital medical devices for telemedicine in morocco: a descriptive qualitative study

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Abstract:

Digital medical devices of Telemedicine (DMDT) can serve as catalysts for universal health coverage in Morocco. The lack of rigorous health technology assessment (HTA) for these DMDT can lead to safety, quality, and patient well-being issues. Despite the existence of a regulatory framework and reimbursement mechanisms, their promotion represents a strategic challenge for the Moroccan healthcare system. The objective of the study was to identify the key success factors for HTA of DMDT in Morocco. This is a descriptive qualitative study with random probability sampling. An online questionnaire was sent to 90 Moroccan medical executives and academics, from November 20, 2024 to February 20, 2025. A descriptive analysis was carried out on the population of our study. A total of 51 participants (56.6%) responded to the questionnaire. Almost all stated that HTA of DMDT in Morocco should be centralized (71%, 36/51), transparent (69%, 35/51), comprehensive (67%, 34/51), mandatory, and independent of health insurance organizations (65%, 33/51). Most emphasized that decision-making autonomy (75%, 38/51), integration of industry data (92%, 47/51), stakeholder involvement (84%, 43/51), and reimbursement flexibility (78%, 40/51) would ensure its sustainability. Participants ranked health benefits (68%, 35/51), resource impact (57%, 29/51), and disease burden (52%, 26/51) as priority elements of this assessment. The need for continuing training (54%, 28/51) remains a necessity for HTA of DMDT in Morocco. Similarly, participants highlighted some challenges specific to the Moroccan context such as the limitation of local production, dependence on imported and expensive DMDT and post-market surveillance. Ten essential factors for enhancing an iterative HTA of DMDT in Morocco have been identified. Furthermore, an alliance between medical experts, academic researchers, industrialists and political decision-makers is necessary for the rapid implementation of this process.

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First Application of the Biological Diatom Index in Morocco: Salinization as a Key Stressor in the Sidi Chahed Dam System

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Abstract:

The ecological structure and distribution of diatom communities in semi-arid freshwater systems are shaped by complex interactions among geological context and climatic forcing, physicochemical gradients, and anthropogenic pressures.

This study presents the first comprehensive seasonal–spatial assessment of diatom communities in the Sidi Chahed Dam reservoir and its main tributaries, Oued Mikkes and Oued Mellah, investigating their relationship with salinity and nutrient status in a semi-arid Moroccan basin. Over a full hydrological cycle (December 2022 to November 2023), we monitored physicochemical parameters, diatom assemblages, and the Biological Diatom Index (BDI) to evaluate ecological status.

Despite generally moderate nutrient levels (nitrate: 0.10–6.52 mg/L; orthophosphate: 0.0046– 0.7254 mg/L, with high intermittency), the system exhibited elevated mineralization, as indicated by electrical conductivity (2.24–4.06 mS/cm), chloride (745.5–2,236.5 mg/L), and sulfate (21.64–386.84 mg/L) concentrations. These mineralization metrics consistently classified the system's status as "bad" to "very bad." In contrast, the Biological Diatom Index (BDI) revealed a more dynamic ecological state, fluctuating between "good" and "bad" depending on season and site, with the poorest conditions occurring in summer. Among the 80 species identified, the communities were dominated by salinity-tolerant taxa, which include Nitzschia palea, Tryblionella hungarica, Cylindrotheca closterium, and Nitzschia reversa. Critically, correlation analyses identified salinity—not nutrients—as the primary driver of community structure (BDI strongly correlated with conductivity/chloride, Spearman's $\rho < -0.5$).

As the first application of the BDI in Morocco, this research validates its use for bioassessment in semi-arid regions while delivering urgent insights for regional water managers tasked with preserving water quality and ecosystem services amid growing pressures from climate change and anthropogenic activity.

Keywords : Diatoms, Biological Diatom Index, physicochemical parameters, Salinity, Sidi Chahed Reservoir.

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Assessment of the quality of life at work of radiologic technologist: The case of the hospital network in the city of Fez

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Abstract:

Work occupies a considerable place in people's lives, it plays an important economic and social role in the health and well-being of individuals, it is no longer perceived as a simple livelihood. However, well-being at work is not only a performance factor but is also perceived as protection against psychosocial disorders including stress. Quality of life at work is now a central issue in healthcare professions, particularly for radiologic technologist, subject to a high workload and specific constraints, these professionals require a rigorous assessment of their QVT in order to better understand the factors that influence it within radiology departments. Our study aims to assess the quality of life at work of radiologic technologist and identify the factors that influence it within the hospital network of the city of Fez.

This is a quantitative, exploratory, and descriptive study conducted between February and June 2025 among 96 radiologic technologist working in the hospital network of the city of Fez. Data were collected using a self-administered “Work Related Quality of Life” (WRQOL) questionnaire.

The results reveal an overall unsatisfactory QWL among radiologic technologist, with an average score of 68.69. Among hospital structures, the CHR recorded the highest score (71.3), followed by the CHU (69.6), while the CHP had the lowest score (54.37). QWL is better among radiologic technologist working normal schedule (73.41) than among those on call (63.77). In terms of work units, interventional radiology has the best QWL (78), followed by oncology (70.56) and nuclear medicine (69.57). radiologic technologist consider workload and work organization to be the most decisive factors in their QWL.

Good QWL, combined with consideration of the factors that influence it, is a key element in maintaining motivated and effective radiologic technologist.

Keywords : Quality of life at work, radiologic technologist, Assessment, Hospital network

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Magnitude of hospital-acquired malaria and associated factors among pediatric inpatients admitted at Hawassa University Comprehensive Specialized Hospital (HUCSH), South Ethiopia

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Abstract:

Malaria remains a leading cause of illness and death among children in sub-Saharan Africa. However, hospital-acquired malaria (HAM) is often not diagnosed or studied enough in areas where it is common. It is important to identify the prevalence of HAM to improve pediatric clinical outcomes and refine hospital infection prevention measures. This study aimed to find out the extent of hospital-acquired malaria in pediatric patients at Hawassa University Comprehensive Specialized Hospital (HUCSH) in South Ethiopia.

We conducted a retrospective cross-sectional study from November 2023 to October 2024. We reviewed medical records of 2,130 pediatric patients (from post-neonatal to 14 years old) admitted to emergency, pediatric, nutritional rehabilitation, orthopedic, and surgical wards. We enrolled 237 patients who developed a fever five or more days after admission.
We categorized cases as confirmed, suspected, or probable based on standard WHO clinical criteria. We analyzed data using SPSS v21.0, and we obtained ethical clearance from the Hawassa University College of Health and Medical Sciences.

Among the 237 febrile patients, 54.4% met the criteria for suspected, probable, or confirmed malaria after five days of admission. Specifically, 54 (22.8%) were confirmed cases, 68 (28.7%) were suspected, and 7 (3%) were probable. Of the confirmed cases, P. vivax was the most common species (72.2%; n=39), followed by P. falciparum (27.8%; n=15). When we used a stricter 7-day post-admission onset threshold, the overall rate of HAM rose to 30.8% (n=73), which included 31 (13.1%) confirmed, 41 (17.3%) suspected, and 1 (0.4%) probable case. Hospital-acquired malaria is very common at HUCSH. It presents a significant challenge for managing pediatric inpatients. The high number of P. vivax cases indicates a considerable role for relapses or hospital transmission.

There is an urgent need to strengthen hospital infection control and malaria policies, including considering radical treatment for relapse at discharge and improving diagnostic abilities. Further studies are necessary to identify specific risk factors and understand transmission patterns.

Keywords: Hospital-acquired malaria (HAM), Pediatric inpatients, Plasmodium vivax, Ethiopia.

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Evaluating the Effectiveness of the future ISO 14001 Environmental Management Systems in Achieving SDG targets

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Abstract:

The ISO 14001 standard is the Environmental Management System (EMS) that is geared toward sustainable environmental practices. With the forthcoming ISO 14001:2025 revision, there is a strong interest in evaluating how these updates can enhance the standard's alignment with some the United Nations Sustainable Development Goals (SDGs). This study investigates the potential effectiveness of the revised ISO 14001 in supporting SDG achievement, considering shifts in climate action priorities, risk management, and digital innovation.

Our work synthesises literature from recent ISO technical committee draft documents, environmental management research, and case studies of EMS implementations. It analyses the planned key changes in ISO 14001:2025, including enhanced climate-related requirements, life cycle perspective, and an expanded focus on sustainability risks across supply chains. The study also examines feedback from global businesses and stakeholders to contextualise the revision's relevance for diverse economic settings.

The analysis reveals that ISO 14001:2025 introduces stronger climate action mandates, improved environmental risk planning, and adoption of digital tools for real-time performance monitoring and reporting. These innovations are likely to increase organisations' accountability and transparency, thus strengthening contributions to SDGs such as Climate Action (SDG 13), Responsible Consumption and Production (SDG 12), and Life on Land (SDG 15). However, the study identifies that the success of these outcomes depends on effective implementation, organisational commitment, alignment with national policies and the growth number of certified organisations.

The future ISO 14001 EMS revision holds significant promise for accelerating progress towards SDGs by embedding sustainability deeper into organisational practices and decision-making processes. To fully realise these benefits, organisations must adopt a proactive approach, adapting the standard's provisions to their specific environmental and operational contexts. This review highlights the critical role of ISO 14001:2025 as a strategic enabler of sustainable development across global industries in particular and other sectors in general.

Keywords: ISO 14001:2025 revision, Environmental Management Systems (EMS) Sustainable Development Goals (SDGs)

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Bacteriological Quality of Beef, Safety Practices, and Predictors along the Supply chain in Southwest Ethiopia

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Abstract:

Beef is a major source of nutrition, but improper handling along the supply chain poses serious public health risks, particularly to vulnerable populations. Bacterial contamination, driven by poor hygiene and inadequate safety practices, is a leading cause of beef-borne illnesses. Studies have not yet comprehensively addressed contamination points and stakeholders' roles. This study assessed bacteriological quality of beef, safety practices, and associated factors along beef retailers in Southwest Ethiopia.

A laboratory-based cross-sectional study was conducted from February to May 2024 among 44 randomly selected beef retailers. Participants included 372 beef handlers, and 398 beef and water samples, selected using systematic random sampling. Data were collected using validated semi-structured tools, and samples were processed following standard bacteriological protocols. Pearson's chi-square test assessed associations between sample categories, retailer types, and bacterial loads. Logistic and multiple linear regression identified predictors of safety practices and bacterial contamination, with significance set at $p \leq 0.05$.

Poor knowledge (65.6%), unfavorable attitudes (65.4%), and poor practices (78.6%) were common among retailer owners/managers. Higher education was linked to favorable attitudes (AOR=3.57, p=0.026). Among handlers, 88.6% lacked training, and 81.9% had no medical checkups; hotel workers showed the poorest practices (60.8%). Good practice was predicted by training (p=0.008) and good knowledge (p=0.001). Bacterial contamination was highest in abattoirs and retailers, with E. coli (42.1%), Salmonella/Shigella spp. (18.6%), and Listeria spp. (13.5%) varying significantly by source ($p<0.05$). Spiced beef had lower fecal coliform counts and infection risk (AOR=0.53, $p<0.05$). Poor practices, sampling time, and location significantly predicted coliform contamination.
Inadequate perceptions, lack of training, and poor hygiene among stakeholders contribute to contamination by pathogenic bacteria. Although coliform presence alone may not indicate direct health risk, high loads reflect sanitation failures. Mandatory training, health screening, and strict hygiene enforcement are essential to safeguard public health.

Keywords: Bacteriological quality of Beef; Safety practices; Southwest Ethiopia.

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Design and Pilot Scale Production of an Alternative Non-Live Attenuated BTV Vaccine in Yeast

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Abstract:

Bluetongue (BT) is an infectious disease of domestic and wild ruminants caused by Bluetongue virus (BTV), an arbovirus of the Orbivirus genus within Sedoreoviridae family. It's primarily transmitted by biting midges of the Culicoides genus. BTV poses a significant threat to the livestock industry, particularly sheep. To date, a total of 36 serotypes of BTV have been characterized worldwide, causing periodic outbreaks occurring most frequently in the Mediterranean basin. The control of BT disease is based on vaccination, and several vaccines have been developed. Live attenuated vaccines and inactivated vaccines are widely used to prevent BT. However, despite their demonstrated efficacy, those vaccines have several limitations, including safety concerns and incomplete cross-protection among BTV serotypes. Recombinant subunit BT vaccines based on BTV structural proteins or virus-like particle vaccines (VLPs) may solve some of these limitations. In this study, we aim to design and develop vaccines that constitute an alternative to conventional attenuated vaccines.
For this, we intend to express the VP2 and VP5 BTV antigens in Saccharomyces cerevisiae, a GRAS microorganism, by fusing the antigens to the secretion and cell wall retention signals of the Pir4 yeast cell wall protein. The VP2 and VP5 BTV structural proteins will be expressed in S. cerevisiae, targeting them to the yeast cell surface, or to the culture medium. The possibility of obtaining virus-like particles (VLPs), mimicking the virus, will also be studied.
Given that the research is currently underway, cloning, gene confirmation, sequencing and transformation of the constructs into the yeast expression system have been successfully completed. The confirmation of VP2, VP5, VLPs expression and assembly is currently under investigation, using immunofluorescence and Western blot analysis. The assessment of antigenicity and evaluation of the potential immunogenicity will be performed to validate the activity of the vaccine candidate in animals.

Keywords: Bluetongue; BTV serotypes; Yeast, Saccharomyces cerevisiae, Mediterranean basin; Recombinant vaccine

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Antimicrobial Resistance Profile of Escherichia coli Isolated From Hospital and Industrial Wastewater Systems

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Abstract:

The global rise of antimicrobial resistance in Escherichia coli poses critical public health challenges, especially in resource-limited settings. This study aimed to investigate the role of untreated hospital sewage and industrially polluted river water as reservoirs for antimicrobialresistant E. coli.

A total of 40 environmental samples were collected, yielding 75 E. coli isolates identified using phenotypic methods. Due to time and resource limitations, 50 isolates were subjected to antimicrobial susceptibility testing by the Kirby-Bauer disk diffusion method against 11 antimicrobial agents. These antimicrobials were selected based on their clinical significance, availability, dominance in resistance mechanism, and utilization trends in Ethiopia.

Notably, E. coli isolates from the Yerer River downstream of industrial waste discharge exhibited the highest multi-drug resistance rate (90%), while upstream isolates were fully susceptible to all tested antimicrobials. The Xadacha River isolates showed moderate multi-drug resistance (66.67%). Hospital sewage isolates displayed escalating multi-drug resistance rates across the 3 departments, including the intensive care unit (62.5%), open patient department (91.67%), and inpatient department (100%). Overall, 86.67% of hospital sewage-derived isolates and 65% of river isolates demonstrated multi-drug resistance. Polymerase chain reaction confirmed antimicrobial resistance-associated genes (tetA: 83.33%; blaTEM: 57.14% of the resistant isolates), underscoring hospital sewage and polluted water as critical reservoirs for antimicrobial resistance gene dissemination. The 2 genes were selected based on their availability, phenotypic resistance profile, and nature as sentinel markers for high-use antimicrobial classes in Ethiopia.

These findings highlight the urgent need for comprehensive wastewater treatment systems, stricter antimicrobial stewardship, and integrated One Health surveillance to mitigate AMR risks to human, animal, and environmental health.

Keywords: Antimicrobial resistance, Escherichia coli, hospital sewage, polluted river.

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Poster Presentation Abstracts

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Assessment of Exposure to Pollutants and Health Symptoms related in workplaces in Southern Benin

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Abstract:

Exposure to environmental pollutants is increasingly being studied, but data on its effects on workers in Africa remain limited. This study conducted as part of the BIONET project, examines occupational exposure to environmental pollutants and associated health symptoms among workers in southern Benin. The BIONET initiative aims to enhance occupational exposure monitoring across three African nations: Benin, Ethiopia and Morocco.

A cross-sectional descriptive survey was conducted in fifteen (15) sentinel sites in southern Benin, with certified investigators collecting data through structured questionnaires. The study population comprised 750 workers from both formal and informal employment sectors, representing diverse occupational categories. Data analysis was performed using STATA 18.0 statistical software.

Working conditions analysis showed that most respondents worked full-time schedules (70.1%), with extended daily hours exceeding eight hours (71.7%) and working weeks extending beyond five days (53%). The frequency of daily personal protective equipment (PPE) use is quite low (39.4%). One-third of respondents (37.1%) report a chronic illness, with hypertension (6.9%) and hemorrhoids (5.5%) being most frequently cited.

Further analysis will provide more comprehensive understanding of cause-effect relationships and inform targeted occupational health interventions for vulnerable worker populations in the region.

Keywords : Sentinel surveillance, Benin, occupational exposure, pollutants.

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A Review of Sentinel Surveillance Approaches for Environmental Health Risks in Low- and Middle-Income Countries

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Abstract:

Sentinel surveillance systems offer a pragmatic solution to monitor environmental health risks in low- and middle-income countries (LMICs), where comprehensive surveillance infrastructures are often lacking. This review synthesizes current applications of sentinel systems for tracking environmental exposures and health outcomes.

We conducted a systematic literature review following the PRISMA guidelines. Scientific databases have been searched for studies published between 2020 and 2025 using defined keywords, including “sentinel surveillance”, “public health surveillance”, “environmental health”, “early warning systems”, “LMICs”. A comparative table has been developed to analyze existing sentinel surveillance systems.

Key use cases include monitoring acute pesticide poisoning through hospital-based systems in Sri Lanka and Kenya; linking air pollution with respiratory illness via health facility data in Ghana and India; and using heat-related morbidity tracking during extreme weather events in Pakistan and Bangladesh. Additional applications include community-level water quality monitoring in Bangladesh and vector-borne disease surveillance in Uganda and Brazil. Despite these advances, major challenges persist, including underreporting, weak integration with national health systems, and lack of standardized indicators.

These preliminary findings underscore the need to strengthen sentinel infrastructure through training, harmonized digital reporting tools, and better data-to-policy translation.

Keywords: Sentinel systems, environmental health, LMIC.

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Integrating Sentinel Surveillance and Climate Data for Cholera Outbreak Early Warning systems in Ethiopia

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Abstract:

Ethiopia faces persistent cholera outbreaks worsened by increasing droughts and heavy rainfall due to climate change. More than 15.9 million Ethiopians reside in districts historically prone to severe cholera outbreaks. There have been efforts to enhance cholera surveillance by integrating it with climate data and prioritizing forecasting to improve adaptation. This study aims to investigate climate adaptation measures, explore temporal associations between climate variables and cholera incidence across Ethiopian districts, and identify observed thresholds and potential climate indicators for enhancing early warning systems.

We conducted a literature review and secondary data analysis of climate-cholera data. Data were sourced from 13 cholera sentinel surveillance systems and the Ethiopian Meteorology Institute. Temporal patterns and lagged effects of temperature and rainfall on cholera were examined using descriptive statistics, Pearson correlation, and time-lag analysis (up to three weeks). We assessed historical temperature and rainfall averages to measure anomalies to determine optimal outbreak conditions. Data visualization, including line graphs, time series plots, and heatmaps, was performed using MS Excel and R.

Cholera transmission followed distinct seasonal patterns, with two primary transmission periods. A primary surge in 7 of 13 districts from June to September tied to heavy rainfall, and a secondary peak in 6 districts from February to May. Temperature was positively associated with cholera in 8 districts, with effects lasting up to three weeks, while rainfall showed variable associations strongest within the same week in 4 districts suggesting districtspecific climate triggers.

Understanding district-specific variations in temperature and rainfall is crucial for managing cholera outbreak risk. These insights can inform early warning systems by providing crucial indicators for detecting potential outbreaks. Strengthening epidemiological forecasting capabilities, particularly in drought- and flood-prone regions, can enhance the cholera early warning system, enabling more timely and proactive interventions.

Keywords: Cholera, Climate change, Sentinel surveillance, Disease outbreaks

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Management of occupational health and safety responsibilities in the context of hospital subcontracting: the Case of Ibn Rochd University Hospital

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Abstract:

The outsourcing of hospital support activities is increasingly being adopted for economic and organizational reasons. However, its management raises major challenges in terms of occupational health and safety, particularly regarding the sharing of responsibilities between the hospital and subcontracting companies. This study aims to evaluate the consideration of occupational health and safety responsibilities by subcontracting companies operating at the Ibn Rochd University Hospital in Casablanca, and to identify gaps in current workplace safety management practices.

Cross-sectional descriptive study based on a review of regulatory literature, a document analysis of contracts and procedures, and semi-structured interviews conducted with a sample of 30 participants, including representatives from the hospital and three subcontracting companies involved in environmental hygiene services.

85% of interviewees reported a lack of clarity in the distribution of responsibilities. All supervisors indicated a communication deficit between hospital teams and subcontractors. Occupational safety is often perceived as an administrative and financial burden. The vast majority of operational staff do not comply with occupational health and safety protocols, mainly due to insufficient training and lack of supervision. Subcontracting is a common practice in university hospitals in Morocco. In the absence of centralized statistics to quantify its extent, available information is often limited to public procurement data space. Our study finds a lack of regulation, inequality of costs and legal risks.

To ensure a high standard of occupational health and safety, contracting authorities and subcontractors must work collaboratively to establish a shared culture of risk prevention. Such synergy is essential for sustainably improving occupational health and safety performance indicators.

Keywords: occupational health and safety, Hospital, subcontracting

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Occupational Health Risks Awareness and Protective Practices among Firefighters' in Morocco

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Abstract:

In Morocco, as in many regions worldwide, building and wildfires pose ongoing environmental and health risks, not only to the general population but also to firefighters, who are directly exposed to hazardous conditions. Despite the significance of this occupational risk, it remains insufficiently studied.

This descriptive study explores Moroccan firefighters' awareness of hazardous exposures and their knowledge and practices regarding the use of Personal Protective Equipment (PPE). This descriptive cross-sectional study employed a questionnaire-based approach to conduct thirty semi-structured interviews with active firefighters engaged in fireground operations across Meknes and Khenifra regions in Morocco. Participants were required to have at least one year of professional experience and volunteered to partake in the study. The structured questionnaire included specific sections on occupational exposure history, knowledge of firerelated health risks, Personal Protective Equipment (PPE) usage practices, and participation in safety training programs.

The findings reveal notable deficits in firefighters' understanding with regard to the long-term health impacts of smoke and toxic substances released during fire incidents. Specifically, our results highlight that many remain unaware of the carcinogenic potential and systemic effects of common fireground contaminants. This pilot study strongly suggests that implementing targeted safety training markedly enhances both risk awareness and practical preventive behaviors, showing a clear path for immediate improvement. Although we've observed a recent upturn in the use of PPE, critical shortcomings are still a reality, particularly the limited availability of certified respiratory protection and inadequate access to essential decontamination facilities at fire stations.

This pilot study underscores the urgent need for comprehensive training, improved protective infrastructure, and robust surveillance systems to safeguard the health of firefighters operating in high-risk and resource-limited environments

Co-funded by the European Union

Patient Safety Incident Reporting Behavior and Its Determinants Among Healthcare Professionals in Ethiopia: A Systematic Review and Meta-Analysis

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Abstract:

Positive patient safety incident reporting behavior is vital for ensuring safety and healthcare quality. However, comprehensive evidence of the reporting rate of incidents among health professionals in Ethiopia is lacking, which may hinder the effectiveness of safety and quality improvement initiatives. Therefore, this systematic review and meta-analysis aims to understand the behaviors of health professionals regarding incident reporting in Ethiopian health care organizations, which is critical for designing effective interventions.

A systematic literature search was conducted on databases, including the electronic databases of PubMed, Web of Science, ScienceDirect, and Google Scholar, and manual searches focusing on articles published until August 2025. Studies involving health professionals in Ethiopia that reported on incident reporting behaviors were included. The Joanna Briggs Institute critical appraisal checklist was utilized to assess study quality, and a meta-analysis determined the overall prevalence of reporting behaviors.

Ten studies were included in the analysis. The pooled prevalence of incident reporting behaviors was 30.80% (95% CI: 24.54–38.06; $I^2 = 96.15\%$). Fear of administrative sanctions and fear of legal penalties were strongly associated with reduced incident reporting behavior. Conversely, the presence of training on reporting systems, support from hospital management, and a positive attitude toward error reporting were positively associated with incident reporting behavior.

The findings indicate that incident reporting behaviors among Ethiopian health professionals remain low, primarily due to gaps in organizational support, inadequate training, and fear-based deterrents. This review underscores the urgent need for multi-level interventions to strengthen patient safety incident reporting behavior within Ethiopian healthcare settings. Establishing nonpunitive feedback-friendly reporting systems, delivering targeted training, and strengthening organizational support are the recommended strategies to improve patient safety and care quality in Ethiopia.

Co-funded by the European Union

Monitoring of Psychological Burden in Healthcare Workers in Morocco: Integrating Salivary Cortisol and Cortisone Biomarkers with Stress and Burnout Assessment

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Abstract:

Although the acute phase of the COVID-19 pandemic has passed, its psychological toll on healthcare professionals (HCPs) remains a pressing concern. Retrospective studies are essential for understanding the long-term mental health effects of the crisis, especially in regions underrepresented in global research. These insights are crucial for informing preparedness and supporting strategies in future health emergencies.

This study aimed (1) to assess the prevalence and determinants of perceived stress and burnout among frontline HCPs in five public hospitals in Morocco, and (2) to evaluate salivary cortisol and cortisone as biomarkers of occupational stress.

A cross-sectional epidemiological study was conducted in 2022 among 200 HCP using validated tools: the Perceived Stress Scale (PSS-10) and the Maslach Burnout Inventory Human Services Survey (MBI-HSS). Descriptive statistics, bivariate analyses (Chi-square, Cramér's V), and ordinal logistic regression were performed using SPSS 26. The experimental phase involved collecting salivary samples from 100 HCPs at two time points, after 30 minutes of work and at the shift end. Cortisol and cortisone levels were measured using LC-MS/MS after solid-phase extraction.

The findings revealed that 52% of HCPs report high levels of perceived stress and emotional exhaustion, while 50.5% met the criteria for clinical burnout syndrome. Statistically significant associations were found between high levels of perceived stress and burnout and several factors, including working in Intensive Care Units (ICUs) or COVID departments, being assigned to COVID units, having on-call work schedules, and experiencing sleep disorders ($p < 0.001$). Biological markers are correlated with psychological stress scores.

This study highlights the prolonged psychological impact of the COVID-19 crisis on Moroccan HCPs and supports the relevance of salivary cortisol and cortisone as potential biomarkers of occupational stress. These findings provide valuable directions for both psychosocial and physiological monitoring strategies in healthcare systems during and after health crises.

Keywords: perceived stress, burnout, cortisol, cortisone, biomarkers, healthcare professionals

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Human exposure to pesticides in the Republic of Benin: a scoping review of existing data, emerging challenges and future orientations

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Abstract:

Scientific research has established worrying links between exposure to plant protection products and human health. In Benin, where the use of these products is steadily increasing, bibliographical data remain insufficient. To fill these information gaps and define relevant lines of research, we carried out a scoping review of existing literature on the health repercussions of pesticide exposure in Beninese populations, including an analysis of the legislative framework and exposure management methods.

The bibliographic search was carried out in PubMed, Web of Knowledge, Scopus, Embase and Google Scholar, targeting articles published between 2005 and 2025 with keywords combining pesticides, Benin and human exposure. Included studies presented data on pesticide use, handling, human exposure and health effects. Peer-reviewed articles were included, complemented by regulatory and institutional documents, press releases and theses, identified through targeted manual searches of Beninese and international institutional websites.

The literature explored pesticide use practices, various health effects and insecticide resistance. Studies showed an association between organochlorine pesticides and the likelihood of obesity or diabetes, and a link between organophosphate/pyrethroid exposure and acetylcholinesterase inhibition in farmers. Other research pointed to poor handling practices among market gardeners and the use of pesticides banned or restricted to cotton in crop production. However, few studies revealed high levels of exposure assessed by biomarkers of exposure, susceptibility and effect.

Despite Benin's regulations, the inappropriate use of pesticides persists, leading to adverse health effects. This study underlines the need for strict enforcement of regulations, continued research, and provides a scientific basis for decisions by the competent authorities.

Keywords: pesticide exposure; effects on human health; Benin; farmers; Beninese regulations

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Exposure to organochlorine pesticides as a predictor to breast cancer: A case-control study among Ethiopian women

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Abstract:

Breast cancer (BC) is becoming one of the most prevalent non-infectious diseases in low and middle-income countries. The steady rise of BC incidence may be related to the different risk factors. Among many, rampant presence of environmental pollutants might be one of the risk factors. Therefore, the aim of this study is to investigate exposure to organochlorine pesticides as a risk factor to breast cancer.

A case-control study design was employed among breast cancer patients and non-breast cancer individuals (controls). Blood samples were collected from 100 study participants (50 cases and 50 controls) followed by serum separation, extraction and cleanup using standard analytical procedures.

The findings revealed that ten organochlorine pesticides were detected in the serum of the study participants. Mean serum level of p,p'-DDE, p,p'-DDT, heptachlor, gamma-chlordane, endosulfan, and dibutyl-chlorendate were significantly higher in the serum of breast cancer patients than the controls.

From the studied pesticides, p,p'-DDT and gamma chlordane are significant predictors for BC, while, others are equivocal. A unit increment of the concentration of p,p'-DDT (AOR; 2.03, 95% CI: 1.041–3.969) and gamma-chlordane (AOR;3.12, 95% CI; 1.186–8.203) would increase the odds of developing breast cancer by two, and three times respectively.

Our study results suggesting that, organochlorines are the possible risk factors for breast cancer in Ethiopia. Decreasing exposure to such organochlorines might have a significant public health relevance in reducing non-communicable chronic illnesses. Besides, continues monitoring of persistent organic pollutants, using body biomarkers is important for disease prevention and device mitigation measures.

Keywords: Breast cancer, pesticides, DDT, Ethiopia.

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Biomonitoring of Occupational Exposure to Mercury Among Dental Health Workers: a systematic review

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Abstract:

Mercury exposure in dental health workers, primarily through the use of dental amalgams, remains a significant concern due to its potential health risks. This systematic review synthesizes the current global evidence on occupational mercury exposure in dental professionals, with a focus on biomonitoring data and associated health outcomes. We searched three electronic databases (PubMed, Scopus, and Web of Science), for primary research on biomonitoring of occupational exposure to mercury among dental health workers published from January 2014 onwards. Nine studies involving 524 dental professionals were included in the analysis. Biomonitoring of mercury was conducted using blood (n=3), urine (n=7), and hair samples (n=2), with most studies showing elevated mercury levels in dental workers compared to controls.

Environmental monitoring studies suggest that mercury vapor concentrations in dental clinics may exceed recommended safety limits, emphasizing the need for better waste management practices. Findings from included studies suggest that mercury exposure may be associated with effect on liver function, immune response oxidative stress and adverse pregnancy outcomes. No association with renal markers was reported.

This review highlights the persisting use of dental amalgam in dentistry and the need for further research to assess the long-term health impacts of low-level mercury exposure and improve safety protocols, particularly in resource-limited settings.

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Building a FAIR Data Ecosystem for Human Biomonitoring and Environmental Health in Africa: Insights from a Scoping Review of International Platforms

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Abstract:

Reliable and interoperable data are essential for addressing Africa's pressing environmental health challenges, including pollution, chemical exposures, and access to clean water. Yet, data often remains fragmented or inaccessible. Since the introduction of the FAIR principles in 2016, several international platforms and other domain-specific registries have demonstrated practical models for enhancing data transparency, interoperability, and usability. In this context, this study conducts a scoping review to (1) identify barriers and enablers to FAIR data implementation in Africa and (2) systematically compare international FAIR-aligned platforms that could inform the design of a context-specific repository for human biomonitoring and environmental health research in Africa.

Peer-reviewed and grey literature (2020 - 2025) were searched across PubMed, Scopus, Web of Science, and organizational repositories. Data were analyzed based on platform characteristics, governance models, technical architecture, and applications to environmental health domains. Comparative analysis focused on how these platforms operationalize FAIR principles, with attention to replicability and transferability to African contexts.

Preliminary mapping highlights common challenges, including but not limited to insufficient infrastructure, lack of metadata standards, and governance gaps. The research confirms there is also a lack in enabling practices such as community-driven design, federated data access, and preregistration of studies. International platforms illustrate diverse models: FAIREHR emphasizes preregistration and structured metadata; HBM4EU/PARC demonstrates cross-country harmonization of biomonitoring data; and VODAN-Africa pioneers locally governed data stewardship. These case studies provide transferable insights, but adaptation to African contexts requires attention to resource constraints, local data governance, and equity in access.

Through this review of international initiatives, we ambition to offer a roadmap for developing a FAIR repository for human biomonitoring and environmental health data in Africa, ensuring data are structured, discoverable, and policy relevant.

Keywords: FAIR, data, repository, environmental health, Africa

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Remote Work and Health in Africa: Physical and Mental Impacts

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Abstract:

Remote work has surged in prevalence since 2020, yet its effects on mental and physical health remain mixed. Much of the current evidence is lacking causal insight and underrepresenting post-pandemic hybrid models in low and middle-income countries.

An empirical survey was conducted in June 2025 to examine physical and mental health outcomes linked to remote and hybrid work across African countries, using validated scales on stress, burnout, work-life conflict, ergonomics, sleep, and lifestyle behaviors. Multivariate regression explored predictors of health outcomes.

Our study comprised 87 respondents, and reported approximately 9% fully remote, and 35% hybrid workers, mainly among managers, accountants, marketers, researchers, and tech professionals. Preliminary findings revealed elevated risks of social isolation, digital fatigue, sedentary behavior, and musculoskeletal pain.

Our work highlights the urgent need for African employers to implement comprehensive ergonomics training, establish formal right-to-disconnect policies, and foster initiatives that strengthen social connectedness in remote settings.

Keywords: Remote work, mental health, wellbeing at work, Africa.

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Stress and Its Association with occupational Injuries and Lower Back Pain among Industry Workers in Ethiopia: A Systematic Review and Meta-Analysis

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Abstract:

Stress affects workers' mental health and exposes them to occupational injuries and lower back pain. However, there is limited comprehensive evidence on the effect of stress on occupational injuries and lower back pain. Therefore, this study aimed to systematically review the effect of stress on occupational injuries and lower back pain among industry workers in Ethiopia.

This review followed the Preferred Reporting Items of PRISMA guidelines. A thorough literature search of PubMed, Google Scholar, HINRI, Semantic Scholar, and Science Direct was conducted from their inception up to March 6, 2025. To extract and analyse data, Microsoft Excel 16 and STATA 17 software were used, respectively. The JBI checklist was used to evaluate the quality of the included studies. The funnel plot and Egger's regression test were applied to evaluate publication bias. To estimate the pooled association and heterogeneity, a random effects model and I^2 test statistics were used, respectively.

This review included a total of 35 observational studies that met the inclusion criteria, with a total sample size of 16,092. The finding demonstrated that stressed industrial workers were two times more likely to be affected by occupational injuries than non-stressed workers (OR = 2.2, 95% CI: 1.92–2.52, I2 = 54.2%, $p < 0.003$). In addition, workers with stress were 1.8 times more likely to suffer from lower back pain than their counterparts (OR = 1.76, 95% CI: 1.56–2.00, I2 = 71.5%, $p < 0.001$). A moderate heterogeneity was found between the association of stress and lower back pain. Sensitivity analyses substantiated the robustness of these findings.

This review demonstrated that stress increases the risk of occupational injuries and lower back pain. Therefore, interventions including mental health support, wellness, and stress management programs such as mindfulness-based interventions, resilience training, and raising awareness about the impact of stress on workers physical and mental health are advised to enhance workplace safety and minimize injury and lower back pain risks.

Keywords: stress, lower back pain, occupational injuries, industry workers, systematic review and meta-analysis

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Risk Perception and Behaviors related to Endocrine Disruptors Daily Exposure among Women of Childbearing Age in Morocco

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Abstract:

Endocrine-disrupting chemicals (EDCs) are widely found in plastics, cosmetics, food packaging, and household products. Their potential links with reproductive health, fertility, and child development make women of childbearing age a particularly vulnerable population. While scientific evidence on EDCs has expanded, little is known about public awareness and behavioral responses in everyday life, especially in North African contexts. This study aimed to assess awareness, risk perception, and preventive practices among women of childbearing age in Morocco.

An online questionnaire was distributed to women aged 18-45 years, and included items on knowledge of EDCs, perceived health risks, trust in product labels, and daily practices to limit exposure (e.g., food storage, cosmetics use, avoidance of plastics).

Results (n = 180) show limited awareness, with 61.1% having never heard of endocrine disrupting chemicals (EDCs). Once informed, most expressed concern about potential reproductive effects. Only 9.4% reported frequently choosing cosmetics labeled as safer (e.g., paraben-free, BPA-free), while 61.7% showed motivation to adopt safer alternatives if they were more accessible and affordable.

Women of childbearing age in Morocco show limited awareness of endocrine disruptors, with behavioral adaptations constrained by socioeconomic factors and lack of clear communication. Awareness raising, access to safer alternatives and regulatory measures remain essential to reduce EDC exposure at the population level.

Keywords: Endocrine disrupting chemicals, women of childbearing age, Exposure, Risk perception, Morocco.

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Occupational Safety and Risk Management in a Specialized Pediatric Service: Targeted Assessment of ISO 9001:2015 Requirements

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Abstract:

The ISO 9001:2015 standard includes several requirements that directly contribute to occupational safety and the working environment, particularly in the chapters on organizational context, planning, support, and operational activities. In a pediatric unit specializing in immunodeficiency, these requirements are essential to protect both staff and patients in a highrisk environment while ensuring the quality and continuity of care.

To assess compliance with ISO 9001:2015 requirements related to occupational safety, identify gaps, and propose improvement actions tailored to the pediatric hospital context. A self-assessment grid was developed by isolating ISO 9001:2015 requirements directly linked to occupational safety and contextualizing them to the hospital environment. Data were collected through focus group discussions with medical and nursing teams, complemented by interviews with the head of department and head nurse. Results were synthesized using radar charts to visualize strengths and prioritize areas for improvement.

The evaluation revealed a moderate overall level of compliance with ISO 9001:2015 requirements related to occupational safety. Strengths included the availability of material and human resources (≈ 70%) and skills management (≈ 50%). Major gaps were identified in the identification and monitoring of internal and external risks, consideration of stakeholders' expectations, and planning of actions to address risks (≈ 35%). Staff awareness remained limited (≈ 30%), internal communication and document management were only partially compliant, and operational control of critical processes, including service validation and management of nonconformities, was still insufficient (often ≤ 30%). These gaps highlight the need for greater formalization and structuring of procedures to ensure a safer and more compliant working environment.

The findings emphasize the need to formalize risk management, integrate clear occupational safety objectives into strategic planning, and strengthen staff awareness and training. The adopted approach, focusing on ISO 9001:2015 requirements related to safety, provides a transferable tool for other hospital services aiming to strengthen occupational safety within their quality management system.

Keywords: Occupational safety, ISO 9001:2015, working environment, risk management, pediatric hospital, Morocco

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Knowledge, Perceptions and Practices related to the Use of Household Cleaning Products in Morocco

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Abstract:

The daily use of household cleaning products raises growing concerns about their potential health effects. In Morocco, personal and domestic hygiene is an important aspect of daily life, however, the national context is characterized by weak regulatory oversight and a lack of information. This study aims to examine the links between the perceptions and practices related to the use of these products and the suspected health effects.

A structured questionnaire was designed following the Knowledge, Perceptions, and Practices (KAP) model. The questionnaire consisted of five main sections: sociodemographic characteristics, knowledge, perceptions, practices and suspected health effects.

83 responses were recorded. 28 household cleaning products were classified into 10 categories (bathroom/toilet, kitchen, laundry, glass, metal, air freshener, floor, carpet, automobile, multipurpose), coming from different chemical families. Most participants had moderate knowledge of cleaning product risks, with gaps in recognizing hazard symbols and safe mixing practices. Frequent use of bleach and poor ventilation were common, and nearly half reported health symptoms such as skin or respiratory irritation. Risk perception was mixed, and safer practices were more frequent among those with higher knowledge levels.

This pilot study underscores the need for targeted education on safe cleaning practices and improved product labeling, alongside stronger regulation to reduce health risks from domestic chemical exposure, particularly among women and vulnerable household members.

Keywords: Cleaning products, health effects, knowledge, perceptions, practices, domestic use, Morocco.

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Environment and Public Health: Integrating Environmental Law into the Training of Nurses and Health Technicians

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Abstract:

The links between environment and health are increasingly recognized as fundamental. Air and water pollution, along with the effects of climate change, are contributing to the rising prevalence of chronic and infectious diseases. The resurgence of vector-borne diseases (such as malaria and dengue) highlights the health impacts of ecological disruption. In this context, raising awareness among health professionals about environmental issues has become a public health necessity. Environmental law, as a set of regulations governing the protection of ecosystems and the management of health risks, plays a key role in preventing these pathologies.

This work is based on a narrative review of international scientific literature addressing the interactions between health, environment, and law. The main sources include publications from organizations such as the WHO and research studies on the effects of pollutants, climate change, and environmental policies on human health.

The literature highlights a direct link between exposure to pollutants (PM2.5, NOx, contaminated water) and the occurrence of respiratory, cardiovascular, or infectious diseases. Environmental law, by regulating air and water quality and waste management, emerges as a crucial tool for protecting public health. However, health training programs still rarely include this legal dimension.

Integrating environmental law into paramedical education is essential to prepare future professionals for emerging ecological health challenges. This will enable them to promote sustainable practices, better inform patients, and contribute to more resilient public health policies in the face of environmental threats.

Keywords: Environmental Health, Nursing Education and Environmental Law

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Applications and Future Perspectives of Artificial Intelligence in Environmental Health: A Narrative Review and Survey Study

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Abstract:

The increasing environmental health problems from global warming and pollution to emerging occupational risks demand cutting-edge technology for real-time monitoring, predictive analysis, and decision-making. Hence, artificial Intelligence (AI), through Machine Learning (ML) and Deep Learning (DL), offers transformative tools to detect, predict, and manage these risks. In this context, this study aims to report on both the current uses and potential future of AI applications in environmental health, and to confront this use with a perception survey among students, researchers, and practitioners.

The review covered peer-reviewed literature from 2020 to 2025 across five priority domains: air and water quality, sanitation, chemical exposures, occupational diseases, and climate-related health impacts. The survey explored awareness, perceived utility, ethical concerns, and expectations for AI use in environmental health among African participants.

Preliminary results from the review indicate rapid growth in AI applications for air quality forecasting, intelligent water quality monitoring, automated chemical exposure assessment, and climate-sensitive disease early warning systems. However, most models remain limited to pilot studies, with scarce large-scale validation and limited integration into public health systems. Survey findings show high perceived usefulness of AI (71,25%) but moderate awareness of current applications (49%) among 240 African respondents. Ethical concerns, particularly regarding data privacy and algorithm transparency, were reported by (38,8%) of respondents.

These findings underscore AI's significant potential to strengthen environmental health monitoring and prediction, while highlighting critical gaps in large-scale implementation, stakeholder awareness, and ethical governance.

Keywords: Artificial intelligence, environmental health, opportunities, challenges, ethics, review.

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Regulatory Framework in Hygiene and Safety Applied to Medical Biology Analysis Laboratories in Morocco

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Abstract:

The medical biology analysis laboratories (LABM) are environments where professionals are exposed to potentially dangerous risks. These risks can lead to various incidents, including biological risks (contamination by a pathogen), chemical risks (exposure to toxic chemicals), or physical risks (mechanical injuries caused by sharp objects). Ensuring hygiene and safety in LABMs is a fundamental public health issue. In Morocco, hygiene and safety within these laboratories are based on a solid and mandatory regulatory framework. This framework is primarily structured around Law 12-01 and the GBEA guidelines.

The objectives of this work are to identify and analyze all the regulatory requirements in Moroccan law concerning hygiene and safety in medical biology analysis laboratories, and then to propose relevant recommendations to address the challenges of their implementation.

We have identified all the regulatory requirements and organized them into a table outlining hygiene and safety requirements applicable to medical biology analysis laboratories. In the next step, we formulated recommendations to address the challenges of their application.

From the analysis of Law 12-01 and the GBEA guidelines, we extracted key points and requirements related to hygiene, safety, waste management, and risk management by strengthening initial and ongoing training, standardizing procedures and quality documents according to the recommendations, and, finally, establishing a system for monitoring proper implementation.

The implementation of Moroccan Law 12-01 and the GBEA is mandatory for medical biology analysis laboratories. However, it enables laboratories to ensure compliance with the regulations in order to protect staff, patients, and the environment, while guaranteeing the quality and reliability of medical analyses.

Keywords: Law 12-01 – Moroccan GBEA – Medical Analysis Laboratory – Hygiene and Safety

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Environmental and Behavioral Factors Affecting Sleep Quality among Young Students in Morocco

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Abstract:

Sleep disturbances are increasingly common among university students and are often linked to academic stress, irregular routines, excessive screen exposure, and stimulant consumption. While international studies report that nearly half of students experience poor sleep quality, little is known about this issue in the Moroccan context. This study aimed to evaluate sleep quality among Moroccan university students and explore its behavioral and environmental determinants.

A cross-sectional survey was conducted among 87 students from different higher education institutions using validated tools including the Pittsburgh Sleep Quality Index (PSQI), Sleep Hygiene Index (SHI), and Environmental Sleep Questionnaire (ESQ).

The results revealed a high prevalence of poor sleep, with a mean PSQI score of 14.43 ± 2.92. Sleep hygiene and environmental conditions also showed suboptimal scores. Correlations between PSQI and both SHI ($r = 0.052$) and ESQ ($r = 0.083$) were weak, and behavioral factors such as caffeine intake after 6 p.m. ($r = 0.161$), screen use before sleep ($r = 0.079$), alcohol or tobacco consumption ($r = 0.105$), and physical activity ($r = 0.012$) showed limited associations. Environmental noise was the most influential factor ($r = 0.172$).

These findings highlight the need for national studies among students, as well as targeted sleep hygiene education and preventive support for Moroccan students.

Keywords: Sleep quality; University students; PSQI; Sleep hygiene; Environmental factors; Morocco

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Study of the Relationship Between Lifestyle and Maternal and Child Health

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Abstract:

It is well established that lifestyle during pregnancy can significantly affect both maternal and child health. The overall objective of this study is to develop a comprehensive profile that considers the simultaneous effects of various lifestyle-related factors among pregnant women, in order to minimize negative impacts and, consequently, reduce gestational and neonatal complications. The findings aim to enhance health-related quality of life (HRQoL) for pregnant women in the province of Settat. Aligned with the Sustainable Development Goals (SDGs), this work primarily contributes to SDG 3 (Good Health and Well-being) by targeting the reduction of maternal and neonatal mortality. It also supports SDG 2 (Zero Hunger) through the promotion of adequate nutrition, and SDG 5 (Gender Equality) by empowering women through better access to information and appropriate healthcare follow-up.

This is a cross-sectional study conducted among 463 pregnant women attending health centers in the Settat province and scheduled to give birth at the Hassan II Provincial Hospital. Descriptive and inferential statistics were computed using SPSS version 21.

The prevalence of gestational complications in the sample was 25%, and neonatal complications 10.2%. After adjusting for potential risk factors, a predictive model of gestational and neonatal complications was developed. Pregnant women who were overweight or obese were found to be four times more likely to experience complications than those with a normal weight [AOR: 3.6; 95% CI (2.3–4.3), p = 0.0001]. Similarly, women who did not take multivitamin supplements or did not adhere to prescribed treatments for pre-existing chronic conditions during pregnancy had, respectively, twice the risk of experiencing complications [AOR: 2.1; 95% CI (1.01–4.6), p = 0.0001] and [AOR: 1.5; 95% CI (1.2–4.6)].

Strategies to reduce maternal and neonatal morbidity and mortality must begin with the identification, monitoring, and management of maternal risk factors. Adopting a healthy lifestyle during pregnancy can significantly prevent potential complications and improve the health-related quality of life of pregnant women.

Keywords: Pregnancy, Lifestyle, Environmental Health, Gestational Complications, HRQoL

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Psychological distress and problematic smartphone use among Moroccan adolescents: a parallel mediation model

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Abstract:

The widespread use of smartphones among adolescents has raised concerns about addiction and its impact on mental health and interpersonal relationships. This study explores the prevalence of problematic smartphone use (PSU) and the mediating effect of fear of missing out and aggression between psychological distress and PSU among Moroccan high school students.

A total of 2202 Moroccan high school students were recruited and asked to complete an online form; or a paper-based version that included the Arabic validated version of the Smartphone Addiction Scale-Short Version (SAS-SV), the Fear of Missing Out Scale (FoMO), the Buss–Perry Aggression Questionnaire-Short Form scale (BPAQ-SF), and the Depression Anxiety and Stress Scale (DASS-21). The data was statistically analyzed by SPSS 25.0 and Jasp 0.17.1 software.

Confirmatory factor analysis results supported the two factors solution for FoMO scale, the three factors solution for DASS-21 scale, and the four factors solution for BPAQ-SF scales. In addition to the direct effect of psychological distress on PSU, an indirect effect via four pathways was highlighted, notably via physical aggression, anger, and the two FoMO factors. Structural Equation Model demonstrated that depression explained 35.42 % of the variance in PSU (CFI= 0.919, TLI= 0.912, RMSEA= 0.053, SRMR= 0.053), stress explained 38.91 % of the variance in PSU (CFI= 0.928, TLI= 0.921, RMSEA= 0.051, SRMR= 0.040), and anxiety explained 35.03 % of the variance in PSU (CFI= 0.913, TLI= 0.905, RMSEA= 0.054, SRMR= 0.056).

PSU was highly prevalent among Moroccan high school students and was significantly associated with depression, anxiety, stress, Fear of Missing Out, physical aggression, and anger. These findings emphasize the need for mental health support and digital literacy programs to foster healthy smartphone use among Moroccan high school students.

Keywords: Problematic smartphone use, psychological distress, fear of missing out, aggression, high school students

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Genetic Diversity and Phylogenetic Relationships of Staphylococcus aureus 16S rRNA Sequences across Africa

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Abstract:

Staphylococcus species are pervasive bacteria that are implicated in infections across clinical, food, and environmental settings, posing significant health and safety concerns. While its prevalence is well documented, the genomic variation and evolutionary connections of S. aureus strains in African contexts remain poorly characterized. This study aims to examine the genetic variation and phylogenetic relationships of S. aureus isolates from Africa and other continents to better understand their evolutionary dynamics and potential transmission routes.

A total of 747 partial 16S rRNA sequences of Staphylococcus species were retrieved from the NCBI database. After preliminary analysis, 701 sequences were excluded for high identity. Only 46 sequences included in the final analysis represented isolates from 10 African countries: Nigeria, Egypt, South Africa, Sudan, Algeria, Kenya, Tunisia, Morocco, Uganda and Madagascar. Additionally, 7 sequences were included from other continents, with three sequences each from Australia, Brazil, Saudi Arabia, China, France, Germany, and the USA. A sequence from Bacillus subtilis in Nigeria was incorporated as an outgroup for phylogenetic validation. Bioinformatics analyses were conducted via Geneious software. Preliminary findings revealed clustering patterns among African isolates, reflecting significant genetic variation across regions. The phylogenetic relationships between African and non-African strains suggested evolutionary interactions, whereas region-specific clades underscored the uniqueness of African isolates.

This study highlights the genetic diversity of Staphylococcus strains across Africa and their evolutionary relationships with global isolates. These findings emphasize the importance of genomic monitoring to inform strategies for controlling S. aureus in public health, food safety, and environmental contexts.

Keywords: Staphylococcus aureus, genetic diversity, phylogenetic analysis, Africa, genomic

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Unveiling the Genetic Diversity of Salmonella enterica in Africa through 16S rRNA Phylogenetic Analysis

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Abstract:

Salmonella enterica is a major pathogen that causes widespread infections, especially in Africa, where it poses significant public health challenges. However, its genetic diversity remains underexplored. This study investigated the phylogenetic relationships of S. enterica strains isolated from human (18%), food (61%), and environmental (21%) sources across Africa.

A total of 575 16S rRNA sequences were retrieved from the SRA-NCBI database, representing isolates from 12 African countries: Congo (2), Tanzania (2), Uganda (2), Sudan (6), Niger (11), Kenya (23), Benin (40), Tunisia (35), Morocco (36), Egypt (88), Nigeria (146), and South Africa (184). Additionally, 8 sequences from non-African regions and one Zika virus sequence were included as an outgroup. Phylogenetic analysis via MEGA and iTOL revealed distinct clustering, with evidence of cross-border transmission and regional genetic diversity.

The long branch lengths in certain clades suggest accelerated evolution, likely driven by antimicrobial pressure. Phylogeographic analysis via MicroReact identified dominant clusters in Egypt and Nigeria, suggesting regional transmission dynamics and potential global exchange routes. These findings underscore the need for targeted surveillance, genomic monitoring, and stricter antimicrobial resistance management to control Salmonella in Africa.

Keywords: Salmonella enterica, Phylogenetic analysis, Africa, Public health

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Development of a Multi-Epitope Peptide Vaccine using in silico immunoinformatics approaches and heterologous protein production

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Abstract:

Bluetongue (BT) is an arboviral disease of domestic and wild ruminants caused by Bluetongue virus (BTV), an arbovirus that belongs to the Orbivirus genus in the Reoviridae family. It is a major livestock disease transmitted by biting midges of the genus Culicoides. BTV is very diverse, with 36 serotypes identified worldwide; this high level of serotypic diversity confounds disease control and means that BTV can cause periodic outbreaks largely centered in the Mediterranean basin. Vaccine remains best prevention method, however, the current liveattenuated and inactivated vaccines have limitations like safety concerns and incomplete crossprotection.

The present study sought to build a multi-epitope vaccine as an alternative strategy for broad and safe protection. The proteins used in this study were VP2 and VP5, which are proteins essential for viral attachment and entry into the cell. We used immunoinformatics analysis to predict conserved CTL, HTL and B cell epitopes which were then assessed for antigenicity, allergenicity and overall safety. Selected epitopes were assembled into a chimeric construct with appropriate linkers and an adjuvant to enhance immunogenicity. Structural modeling and in silico validation confirmed the stability, antigenicity, and immune potential of the designed construct.

The optimized gene sequence was synthesized, cloned into an expression vector, and successfully expressed, allowing the in-vitro production of the recombinant multi-epitope protein. This work illustrates the feasibility of integrating computational design with laboratory validation for the development of broad-spectrum vaccines not only against BTV, but also as a versatile framework applicable to the development of next-generation vaccines against other viral pathogens.

Keywords: Bluetongue virus – Immunoinformatics – Multi-Epitopic vaccine design – Heterologous protein production – Reverse vaccinology

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The Impact of Land-Use Changes on the Proliferation of Aedes Mosquitoes, Dengue Vectors, in Togo; West Africa

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Abstract:

Mosquitoes constitute a major public health concern due to their role as vectors for numerous infectious diseases such as malaria, yellow fever, dengue, chikungunya, Zika, and lymphatic filariasis. In West Africa, and particularly in Togo, demographic boom, deforestation, changes in land-use patterns, and climate change are altering natural ecosystems and influencing the spatial distribution of disease vector species, including mosquitoes. An entomological study was conducted in six districts of Togo to characterize mosquito diversity, specifically Aedes species, and to relate their spatial distribution to land use along an ecological gradient (urban, rural, forest zones).

A total of 1,657 mosquitoes were collected, distributed among 6 species belonging to 4 genera. Statistical and ecological analyses (alpha and beta-diversity indices) show that Aedes aegypti clearly dominates in urban environments, while Culex spp. is primarily present in rural and forest environments, with a p-value of 2.2e-16. Shannon's H' index is equal to 0.956, Simpson's index = 0.562, inverse Simpson 1/D = 2.282, and Pielou's evenness J = 0.533. This result allows us to affirm that two randomly chosen individuals belong to different species, which is consistent with a moderate balance of abundances.

The beta-diversity Jaccard indices (presence/absence) are: Rural vs Forest = 0.400, Urban vs Forest = 0.500, Urban vs Rural = 0.167. In the same context, the Bray-Curtis abundance gives the following intersections: Rural vs Forest = 0.841, Urban vs Forest = 0.939, Urban vs Rural = 0.598. These values are very high, indicating a strong dissimilarity in terms of relative abundance, especially between forest and urban areas (93.9%). The community structure is influenced by land-use changes, showing significant dissimilarities.

Keywords: Aedes mosquitoes, urbanization, vector ecology, land use, medical entomology

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Determinants of sustainable solid waste management in Jimma City, Southwest Ethiopia

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Abstract:

Exponential urban growth has led to a significant increase in solid waste production, making solid waste one of the most significant issues faced by urban spaces in developing countries. This rising volume of solid waste has led to pressing public health and environmental concerns, such as water, soil, and air pollution, increased greenhouse gas emissions, and the spread of diseases. Thus, this study aimed to evaluate the sustainable solid waste management practices and challenges in Jimma City, southwestern Ethiopia.

A community-based cross-sectional study design was employed in this study. Quantitative data and solid waste samples were collected between 01/01/2024 and 01/03/2024 via stratified random sampling from 820 participants in Jimma City, Southwest Ethiopia. The data was analyzed using STATA 18, and a p-value <0.05 was used to determine the level of statistical significance.

This study revealed a solid waste generation rate of 0.66 Kg/capita/day and the majority of households (84.63%) do not segregate their solid waste at a point of generation; only 38.66% of Households had access to door-to-door solid waste collection services even though about 81.71% of households are willing to pay for solid waste collection services and 69.76% of Households dump waste along rivers or roadsides. Household income, geographic location, level of education, and attitude are the major determinants of sustainable solid waste management, with Average Marginal Effects of (0.0411, 0.1098, 0.0621, 0.0495), respectively.

Keywords: Solid waste, solid waste composition, solid waste generation, sustainable solid waste management, environmental pollution

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Geo-AI for Urban Health Risk Assessment in Low and Middle-Income Environments: Mapping Air Pollution and Heat Risks in Meknes Morocco

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Abstract:

Rapid urbanization in low- and middle-income countries is intensifying exposure to environmental hazards such as air pollution, heat islands, and water contamination, posing significant threats to public health. While Geographic Information Systems (GIS) have long supported spatial health analyses, traditional methods often fall short in delivering timely, adaptive, and predictive insights needed for proactive interventions. This study explores the potential of the integration of geospatial analytics and artificial intelligence (Geo-AI) to enhance urban health impact assessment and risk mapping in complex urban settings.

A scoping review of the current applications of GIS and Geo-AI in tracking urban environmental stressors, including air and water pollution, thermal exposure, noise, and access to green spaces has been conducted. Key tools, methodological advances, and implementation challenges are critically examined across a range of global case studies. Building on this foundation, we propose a predictive Geo-AI framework tailored to the city of Meknes in Morocco. Model performance is benchmarked against conventional GIS approaches in terms of spatial precision and predictive accuracy.

Key tools include satellite-based remote sensing platforms (e.g., NASA, Sentinel), open geospatial datasets (OpenStreetMap, CAMS), and machine learning frameworks for spatial prediction and classification. Methodological advances have enabled the integration of heterogeneous datasets, combining environmental, health, and urban infrastructure data, along with spatiotemporal modeling, fine-scale risk mapping, and AI-based forecasting of exposure-related health impacts. However, several implementation challenges persist, including data gaps at fine spatial scales, interoperability issues, computational constraints, and ethical concerns related to geocoded health data. Additionally, the limited translation of technical outputs into actionable insights for urban planning and policy remains a major barrier to realworld impact. In Meknes city, the designed beta model integrates multi-source environmental data and urban infrastructure parameters to generate high-resolution, dynamically updated risk maps, highlighting spatial hotspots of vulnerability to air pollution and heat stress.

Our results offer a scalable, data-driven approach to support urban public health planning, early warning systems, and climate adaptation strategies, particularly in resource-constrained settings, hence contributing to the development of smarter, healthier, and more resilient cities.

Keywords: Geo-AI, Environmental health, Urban risk mapping, impact assessment.

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Cookware made from scrap metal: prevalence of use and knowledge of health hazards among consumers and manufacturers in DR Congo

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Abstract:

Previous studies revealed elevated blood Pb among artisans manufacturing cooking pots by smelting scrap metal (1) and also potential high dietary intake of Pb by consumers using such artisanal cookware (ACW) (2). This study aimed to evaluate the potential public health impact of using ACW in two mining provinces of DR Congo.

In a cross-sectional study, we interviewed women living in two rural villages [Kilongo (n=80), Kisenda (n=59)] and administered an online questionnaire to university students from two large cities [Lubumbashi (n=301) and Kolwezi (n=317)] about the household use of ACW; the reasons for its use or non-use, and knowledge of possible health hazards. We also evaluated the knowledge of occupational health hazards among 81 artisanal workers from three types of workshops (carpentry, cookware, battery repair)..

In the villages, all interviewees reported using ACW daily. Among urban households, daily use of ACW was more prevalent in Kolwezi (64%) than Lubumbashi (54%). Using ACW was associated with socioeconomic status ($p<0.001$). Durability and cooking quality were the main reasons for using ACW in villages (40%) and cities (30%). Respondents did not associate ACW with health risks, but mentioned changes in food colour, taste, smell or the presence of small metal pieces in villages (75%) and cities (11%). Among artisans, carpenters (85%) reported health hazards related to their work against only 4% of battery repairers and cookware manufacturers.

The use of ACW made from recycled scrap metal is widespread in this region (and probably also elsewhere in Africa). Neither the makers of ACW, nor the users of ACW are aware of the potential health risks. . Solutions should consider the socioeconomic situation, the protection of manufacturers (and their children and neighbours) and consumers.

Keywords: Prevalence, artisanal cookware, knowledge, health hazar

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Child-owned poultry model sustained improved poultry husbandry and egg feeding, yet corralling persists; calls for strategic support for cage utilization

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Abstract:

Chicken corralling is common in rural Ethiopia and associated with child stunting. A cluster randomized controlled trial conducted from May to November 2016 in Halaba, Southern Ethiopia tested a nutrition-sensitive poultry intervention. It declared child ownership of chickens through a novel approach, the "Chicken Gift Ceremony model" giving each child (n=122) two local hens as a gift. The intervention promoted cage utilization to reduce fecal contamination of the environment and direct contact of children with the chickens to prevent zoonotic disease (Campylobacter infection) transmission. It also encouraged one-egg-a-day consumption and eggshell powder (ESP) as a calcium source.

After six months, chicken numbers nearly doubled (460); day and night time cage utilization increased from 6.5% to 27% and8.7% to 24.6% respectively; egg intake increased from <1 to 17 egg/child/month; and ESP consumption rose from zero to 17 days/child/month. This follow-up study assessed whether these practices were sustained fifteen months post-intervention. In March 2018, all former participants were revisited for interviews. Dietary data were collected through weekly recall and chicken cage/shelter usage was physically observed. Of 115 households (94.3% participation), 86.1% of children still owned chickens with 350 birds total. The remaining had lost their chickens due to disease and predators. Weekly egg consumption increased from 77% at the project's end to 82.6% though not significant (P=0.287), while ESP intake remained steady (73.8% vs 70.4. Day time cage utiization increased (34.7%) while and night cage usage declined 20%. However, cage utilization (both day and night) remained statistically comparable to the levels at project end.

The child-owned poultry model demonstrated strong sustainability for chicken production, cage utilization and nutrition practices. However, persistent corralling necessitates strategic intervention, including providing technical and material support for cage construction strengthening promotion for their utilization.

Keywords: corralling, chicken, poultry, cage, egg

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