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HYGIENIC DETERMINANTS OF NON-COMMUNICABLE DISEASES IN URBAN AND RURAL POPULATIONS

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Abstract: Non-communicable diseases (NCDs) constitute the leading cause of global mortality. This article investigates the distinct hygienic determinants driving NCD prevalence in urban versus rural populations. While urban areas face health risks associated with industrial pollution, high population density, and sedentary lifestyles (the "urban penalty"), rural populations encounter specific challenges related to agricultural chemical exposure, indoor air pollution from biomass fuels, and limited sanitation infrastructure. Utilizing a comparative analytical approach, this study highlights that while urbanization correlates with higher rates of cardiovascular diseases and diabetes due to environmental stressors, rural areas exhibit elevated risks for chronic respiratory diseases and pesticide-related malignancies. The findings emphasize the need for location-specific public health hygiene interventions.
Keywords: Non-communicable diseases, urban health, rural hygiene, air pollution, pesticides, environmental health, epidemiology.

SHAHAR VA QISHLOQ AHOLISIDA YUQUMLI BO‘LMAGAN KASALLIKLARNING GIGIYENIK DETERMINANTLARI

Annotatsiya: Yuqumli bo‘lmagan kasalliklar (YBK) global o‘limning asosiy sababidir. Ushbu maqola shahar va qishloq aholisi o‘rtasida YBK tarqalishiga sabab bo‘luvchi o‘ziga xos gigiyenik omillarni o‘rganadi. Shahar hududlari sanoat ifloslanishi, aholi zichligi va kam harakatli turmush tarzi bilan bog‘liq xavflarga ("shahar jarimasi") duch kelsa-da, qishloq aholisi qishloq xo‘jaligi kimyoviy moddalari ta’siri, biomassa yoqilg‘isidan kelib chiqadigan ichki havo ifloslanishi va cheklangan sanitariya infratuzilmasi bilan bog‘liq muammolarga duch keladi. Qiyosiy tahlil usulidan foydalangan holda, ushbu tadqiqot shuni ko‘rsatadiki, urbanizatsiya atrof-muhit stressorlari tufayli yurak-qon tomir kasalliklari va diabetning yuqori darajasi bilan bog‘liq bo‘lsa, qishloq joylarida surunkali nafas yo‘llari kasalliklari va pestitsidlar bilan bog‘liq xavfli o‘smalar xavfi yuqori. Natijalar hududga xos gigiyenik aralashuvlar zarurligini ta’kidlaydi.
Kalit so‘zlar: Yuqumli bo‘lmagan kasalliklar, shahar salomatligi, qishloq gigiyenasi, havo ifloslanishi, pestitsidlar, atrof-muhit salomatligi, epidemiologiya.

ГИГИЕНИЧЕСКИЕ ДЕТЕРМИНАНТЫ НЕИНФЕКЦИОННЫХ ЗАБОЛЕВАНИЙ У ГОРОДСКОГО И СЕЛЬСКОГО НАСЕЛЕНИЯ

Аннотация: Неинфекционные заболевания (НИЗ) являются основной причиной смертности в мире. В данной статье исследуются различные гигиенические детерминанты, влияющие на распространенность НИЗ среди городского и сельского населения. В то время как городские районы сталкиваются с рисками для здоровья, связанными с промышленным загрязнением, высокой плотностью населения и малоподвижным образом жизни («городской штраф»), сельское население сталкивается со специфическими

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проблемами, связанными с воздействием сельскохозяйственных химикатов, загрязнением воздуха в помещениях от сжигания биомассы и ограниченной санитарной инфраструктурой. Используя сравнительно-аналитический подход, данное исследование показывает, что хотя урбанизация коррелирует с более высоким уровнем сердечно-сосудистых заболеваний и диабета из-за стрессовых факторов окружающей среды, в сельской местности наблюдается повышенный риск хронических респираторных заболеваний и злокачественных новообразований, связанных с пестицидами.
Ключевые слова: Неинфекционные заболевания, городское здоровье, гигиена села, загрязнение воздуха, пестициды, гигиена окружающей среды, эпидемиология.

INTRODUCTION

Non-communicable diseases (NCDs)—primarily cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes—are responsible for 74% of all deaths globally, claiming approximately 41 million lives each year. While genetic predisposition plays a role, the epidemiological transition has shifted the focus toward environmental and hygienic determinants as primary drivers of these conditions.

The environment in which people live, work, and age significantly influences their health outcomes. This environment is bifurcated into two distinct archetypes: the urban and the rural. Rapid urbanization has created dense metropolises characterized by specific hygienic challenges, such as ambient air pollution and noise, often referred to as the "urban health penalty." Conversely, rural areas, often romanticized as pristine, harbor distinct and potent hygienic threats, including exposure to agrochemicals, unsafe drinking water, and indoor air pollution from solid fuel use.

Understanding the divergence in hygienic determinants between these two settings is critical for tailoring effective prevention strategies. A "one-size-fits-all" hygiene policy is insufficient when the root causes of NCDs differ fundamentally between a city dweller breathing exhaust fumes and a farmer exposed to pesticides. This article aims to analyze and compare the hygienic determinants of NCDs in urban and rural populations.

LITERATURE REVIEW

Urban Hygienic Determinants - The urban environment is defined by high population density and anthropogenic activity. Research by Landrigan et al. (2018) identifies ambient air pollution ($PM_{2.5}$, NO_2) as a leading cause of urban NCDs, linking it directly to ischemic heart disease and stroke. Furthermore, the "obesogenic environment" of cities—characterized by the availability of processed foods and lack of green spaces—contributes to the rising incidence of Type 2 Diabetes (Sallis et al., 2016). Noise pollution, a specifically urban hygienic issue, has also been correlated with hypertension and stress-related disorders.

Rural Hygienic Determinants - Rural populations face what is often termed the "toxicity of poverty." The use of solid fuels (wood, dung, coal) for cooking and heating remains prevalent in rural areas of developing nations. According to WHO (2022), household air pollution is responsible for millions of premature deaths, primarily from Chronic Obstructive Pulmonary Disease (COPD) and lung cancer. Additionally, agricultural workers are chronically exposed to organophosphate pesticides, which literature links to neurodegenerative diseases and non-Hodgkin lymphoma (Alavanja et al., 2013).

Water and Sanitation - While urban areas often struggle with aging infrastructure and industrial runoff contaminating water supplies, rural areas frequently lack treated water entirely. This

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hygienic gap influences not only infectious diseases but also NCDs, as chronic exposure to heavy metals (like Arsenic) in groundwater is a known carcinogen affecting rural communities disproportionately.

METHODS

This study employs a comparative environmental health analysis based on a review of global epidemiological data.

Data Sources - Reports from the World Health Organization (WHO), Global Burden of Disease (GBD) studies, and peer-reviewed environmental health journals (2015-2024).

Stratification - Populations were stratified into "Urban" (density >400 persons/km²) and "Rural" (density <150 persons/km² or agriculture-dependent).

Determinants analyzed: 1) Physical Environment - Air quality (Indoor/Outdoor), Water quality. 2) Chemical Environment - Industrial toxins vs. Agricultural chemicals. 3) Lifestyle Hygiene - Diet, physical activity, and occupational hazards.

Analysis - Comparison of NCD prevalence rates correlated with specific environmental hygienic markers.

RESULTS

The analysis reveals a distinct dichotomy in the hygienic risk profiles of urban and rural populations.

Comparative Risk Factors - Table 1 outlines the primary hygienic determinants driving NCDs in both settings.

Table 1. Hygienic determinants of NCDs: Urban vs. Rural

Determinant category	Urban population risk factors	Rural population risk factors
Air hygiene	Outdoor Pollution: High PM2.5, Nitrogen Oxides (Traffic/Industry)	Indoor Pollution: Biomass fuel smoke (CO, Particulates)
Chemical exposure	Heavy metals (Lead), Endocrine disruptors (Plastics)	Agrochemicals (Pesticides, Fertilizers, Herbicides)
Dietary hygiene	High consumption of ultra-processed foods, excess sodium/sugar	Food insecurity, consumption of micotoxin-contaminated grains
Physical activity	Sedentary lifestyle (Office work), low physical exertion	High physical exertion, but risk of musculoskeletal disorders
Water hygiene	Microplastics, Industrial effluents	Biological contamination, Arsenic/Fluoride in groundwater

Disease prevalence correlation - Table 2 demonstrates how these determinants translate into specific disease burdens.

Table 2. Dominant NCDs by geographic setting

NCD Category	Prevalence trend	Primary hygienic driver
Cardiovascular Diseases	Higher in Urban	Air pollution, stress, sedimentary lifestyle
Chronic respiratory	Higher in Rural	Indoor biomass burning, dust exposure

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diseases	(Low-income)	
Type 2 diabetes	Higher in Urban	Obesogenic environment, dietary habits
Specific cancers	Mixed	*Urban:* Lung (Traffic); *Rural:* Stomach/Esophageal (Diet/Water)
Toxicological outcomes	Higher in Rural	Acute and chronic pesticide poisoning

DISCUSSION

The results highlight that "hygiene" in the context of NCDs extends far beyond personal cleanliness; it encompasses the entire ecological integrity of the living environment.

The Urban Paradox - Urban residents generally have better access to healthcare, yet they suffer higher rates of lifestyle-related NCDs. This is driven by environmental hygiene failures: poor air quality and noise pollution. The "Urban Heat Island" effect also exacerbates cardiovascular stress. The hygienic intervention here requires city planning—green zones, emission controls, and active transport infrastructure—rather than just medical treatment.

The Rural Neglect - Rural populations are often victims of environmental injustice. The high prevalence of COPD among non-smoking rural women is directly attributable to the hygienic failure of household energy (biomass cooking). Furthermore, the unregulated use of pesticides represents a massive chemical hygiene failure. Unlike urban pollution, which is visible (smog), rural chemical exposure is often invisible until chronic disease manifests.

The Convergence - Interestingly, as rural areas modernize (peri-urbanization), they are beginning to experience a "double burden." They retain traditional risks (biomass smoke) while adopting modern risks (processed foods, motorized transport). This transition phase is critical for hygienic intervention to prevent an explosion of NCDs.

CONCLUSION

The prevention of Non-Communicable Diseases requires a paradigm shift in how we view hygiene, moving from a pathogen-centric model to an environmental-determinant model.

For Urban Areas - Public health policy must focus on Environmental Hygiene. This includes strict regulation of industrial emissions, traffic management to reduce PM2.5, and urban planning that promotes physical activity (walkability). Food hygiene regulations must address the nutritional quality of processed foods, not just their safety.

For Rural Areas - Interventions must focus on Occupational and Domestic Hygiene. Urgent programs are needed to replace biomass stoves with clean energy sources (LPG, electric) to reduce respiratory disease. Strict enforcement of protective equipment (PPE) usage for farmers handling pesticides is a critical hygienic necessity.

Monitoring and Education Strengthening monitoring systems to detect environmental toxins in rural water and urban air is essential. Education campaigns should be context-specific: teaching urbanites about the dangers of sedentary behavior and processed foods, while educating rural communities about chemical safety and indoor ventilation.

Final Thought Ultimately, the hygienic determinants of NCDs are structural. Reducing the burden of cancer, heart disease, and diabetes requires political will to clean the air we breathe, the water we drink, and the environment in which we work, regardless of whether that environment is a high-rise office or a harvest field.

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