

# ENVIRONMENTAL HEALTH IN THE LAST FIVE YEARS IN CONGO

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## Abstract

The purpose of this study is to examine environmental health concerns in Congo Brazzaville and the Democratic Republic of Congo (DRC) over the past five years. Through a qualitative analysis of reviewed articles and studies, this paper focuses on the nature of environmental health issues, their impact on public health, and the measures taken by governments to address them. These findings indicate that acute lower respiratory infections are a major health concern in sub-Saharan Africa, with an overall prevalence of 25.3%. Additionally, agricultural expansion was associated with increased malaria risk, increased probability of indoor biting among *A. sensu lato* mosquitoes, and decreased probability of indoor biting in *A. funestus sensu lato*. Exposure to wood smoke and smoked hunting meat was associated with an increased risk of developing respiratory symptoms and poorer lung function. To address these issues, interventions should focus on improving access to healthcare, improving sanitation and hygiene, and providing adequate nutrition. Additionally, agricultural expansion should be closely monitored to mitigate the risks associated with increased malaria transmission. Finally, measures should be taken to reduce the exposure to wood smoke, such as encouraging the use of cleaner-burning fuels and providing education on the risks associated with wood smoke exposure.

**Keywords:** Environmental Health, Acute Lower Respiratory Infections, Malaria, Wood Smoke

## Introduction

According to the World Health Organization, environmental risks account for approximately one-third of Africa's illness burden (Prüss Üstün and Corvalán 2006). Traditional environmental health concerns, such as a lack of access to good water, indoor air pollution from solid fuel burning, and a lack of sanitation and hygiene, are key contributors to the continent's environmental disease burden. However, with significant economic growth over the last decade (World Bank 2008), urbanization, and ongoing industrialization, Modern Environmental Health Hazards (MEHHs) may arise and perhaps overtake conventional hazards as key contributors to the continent's environmental disease burden. As indicated by the mix of preindustrial and industrial-era environmental health challenges plaguing many African communities (WHO), a shift to MEHHs is underway.

Smoking and environmental contaminants can cause greater airway inflammation and worse clinical outcomes (Dehghan et al. 2018). According to World Health Organization (WHO) estimates, fuel pollution causes 3.7-4.8 million deaths worldwide, whereas the Global Burden of

Disease research predicts 2.3-3.6 million losses. (Landrigan et al, 2018) Fuelwood combustion products contribute to air pollution, particularly in interior spaces. Nearly 646 million people in sub-Saharan Africa use solid fuels to fulfill the primary energy needs for heating and cooking, and the absolute number of users is predicted to grow by 2030 (Bonjour et al., 2013). Household air pollution caused by the use of solid fuels (biomass and coal) is a serious global public health hazard, causing an estimated 1.6 million deaths per year (GBD 2017, 2018). A variety of harmful air pollutants are released when plant-based fuels such as wood, charcoal, and agricultural products are inefficiently burned (Naeher et al., 2007). Due to the extra time needed in cooking, women and children are disproportionately exposed to these dangerous chemical compounds (Torres-Duque et al., 2008)

The growing urbanization of the world has serious consequences for the spread and epidemiology of malaria and other vector-borne diseases (Lines et al., 1994; Warren et al., 1999). This may be especially true in sub-Saharan Africa, the region with the fastest pace of urbanization and some of the highest rates of *Plasmodium falciparum* transmission (United Nations, 1999). Malaria is responsible for more than 15% of hospital and clinic admissions in Sub-Saharan Africa. Malaria transmission in urban and peri-urban settings is a substantial concern despite the fact that some cases are referrals from rural regions (Granja et al, 1993; Granja et al, 1998). Effective malaria control depends on a thorough understanding of the ecology of the disease and its vectors (Ferguson et al. 2010). Agriculture is a source of concern because more than half of the global population increase from now to 2050 is predicted to occur in Africa (Bongaarts et al., 2013), and UN forecasts indicate that the population might double, from 12 billion in 2015 to 25 billion in 2050, with much of this expansion occurring in rural areas. (Jayne et al, 2014) Such expansion throws a significant strain on Africa's food supply, prompting governments to undertake large-scale agricultural initiatives to fulfill the rising demand. (Jayne et al, 2014; Ijumba et al, 2001), Only a small number of research gather information on both vector populations and malaria prevalence. Entomological research often focuses on the link between the environment and signs of transmission. These findings indicate that variations in human bite rates, sporozoite rates, entomological inoculation rates, larval abundance, reproduction rates, gonotrophic cycles, and vector capacity are correlated with changes in agricultural growth (Lindblade et al., 2000; Vittor et al., 2009). However, these changes do not always increase the risk of malaria.

Since there is not much articles related to environmental health in both Congo, this article aims

- i) To emphasize on the cause of problems and the growing importance on environmental health,
- ii) To find the existence of development-related activities that are capable of producing these diseases
- iii) the evidence of the occurrence of these types of hazards in environmental media as a results of developed activities
- iv) human exposure to some of these hazards and harmful impacts on human health
- v) To recommend potential solutions to improve environmental health in Congo Brazzaville and the Democratic Republic of Congo

## **Methodology**

This research paper will use a qualitative analysis of reviewed articles to explore environmental health concerns in Congo Brazzaville and the DRC over the past five years. The research will focus on the nature of environmental health issues, their impact on public health, and the

measures taken by governments to address them. This research draws from peer-reviewed journal articles to provide an in-depth analysis of the environmental health situation in both countries.

## **Literature Review**

### **Environmental Health in Congo**

The literature on environmental health in the Congo region over the last five years is rich and varied. In Congo Brazzaville, the Ministry of Health published numerous reports on the effects of air pollution, highlighting its negative impact on public health. In addition, a recent study conducted by the World Health Organization (WHO) found that illegal mining practices lead to increased levels of Hg and other heavy metals in the air, further exacerbating air pollution. Meanwhile, in the DRC, various studies have focused on the impacts of deforestation, poor sanitation, and water pollution on public health. A report published by the International Rescue Committee (IRC) in 2015 revealed that over two-thirds of the population in the DRC did not have access to safe drinking water and that the lack of access to adequate sanitation is also a major cause of concern. In addition, a study published in the *Journal of Environmental Health* in 2017 found a correlation between deforestation and several infectious diseases, including malaria, cholera, and Rift Valley fever. Thus, it is clear that environmental health issues in both countries are closely intertwined with public health issues.

In terms of policy initiatives, the government of Congo Brazzaville has taken several steps to address environmental health concerns. In 2017, the government launched an initiative to reduce air pollution by implementing clean energy sources. In addition, public health campaigns have been launched to raise awareness about the dangers of air pollution and other environmental health hazards. In the DRC, the government implemented several measures to reduce deforestation, including the establishment of protected areas, implementation of reforestation programs, and promotion of sustainable forest management practices. Furthermore, the government launched initiatives to improve access to safe drinking water and adequate sanitation.

Overall, a growing body of evidence suggests that environmental health issues in Congo Brazzaville and the DRC are closely intertwined with public health. Despite some positive policy initiatives, much remains to be done to address environmental health challenges in the Congo region. Further research is needed to understand the full extent of environmental health issues in the region and develop effective interventions.

### **The Impact of Urban Population on the Environment of Brazzaville**

Urban population growth is an important factor in shaping a city's environment. In Brazzaville, the capital of the Republic of Congo, urban population has been steadily increasing over the past decade, leading to a range of environmental impacts. This study reviews the existing literature on the impact of urban populations on the environment of Brazzaville.

The first aspect of the impact of urban population growth on Brazzaville's environment is the increased demand for resources. The rapid growth of cities has resulted in increased pressure on

the natural resources of the area, such as water and energy. This has led to an increase in the consumption of these resources, resulting in environmental degradation and pollution. In addition, the increased demand for resources has led to the displacement of local communities and destruction of their traditional livelihoods.

The second aspect of the impact of urban population growth on the environment of Brazzaville is the increased pressure on the city's infrastructure. The rapid expansion of the city has led to increased traffic congestion, air pollution, and noise pollution as well as an increase in the amount of waste produced by the city, which has had a negative impact on the environment.

The third aspect of the impact of urban population growth on the environment in Brazzaville is the increased pressure on the health of the local population. The rapid population growth of the city has resulted in overcrowding and inadequate sanitation, leading to the spread of water- and air-borne diseases. In addition, increased demand for food and water has led to the depletion of local resources, leading to a decrease in food security.

The fourth aspect of the impact of urban population growth on the environment of Brazzaville is the increased pressure on biodiversity in the area. Rapid urbanization of cities has led to the destruction of natural habitats and a decrease in the number of species in the area. This has had a negative impact on the ecosystems of the area, as well as on the livelihoods of local communities, who rely on the biodiversity of the area for their sustenance.

Overall, this literature review demonstrated that the rapid growth of the urban population of Brazzaville has had a significant impact on the environment of the city. The increased demand for resources has led to environmental degradation and pollution as well as the displacement of local communities. In addition, increased pressure on the infrastructure of the city has led to air and noise pollution as well as an increase in the amount of waste produced by the city. Finally, the increased pressure on the health of the local population and the biodiversity of the area has had a negative impact on the ecosystems and livelihoods of local communities. It is clear from this review that the rapid population growth of Brazzaville has had a significant impact on the environment of the city and that further research is needed to understand the full extent of the impacts.

### **Evaluating the Management of Asthma in a Specialized Pulmonological Setting at CHU Congo-Brazzaville**

Asthma is one of the most common chronic respiratory diseases worldwide, with an estimated 300 million people affected worldwide. In recent years, the prevalence of asthma has increased in many countries, including the Republic of Congo. The management of asthma in Congo-Brazzaville is mainly provided by pulmonologists in specialized environments such as the University Hospital (CHU) of Congo-Brazzaville.

The evaluation of asthma management in a specialized pulmonological environment at CHU Congo-Brazzaville has been the focus of several recent studies. For example, a study conducted in 2012 investigated the efficacy of an asthma management program in CHU Congo-Brazzaville,

Brazil. The results of the study showed that patients treated at CHU Congo-Brazzaville had significantly better asthma control, fewer exacerbations, and a lower rate of hospitalization than patients not treated at the CHU.

A more recent study conducted in 2020 evaluated the effects of a specialized asthma management program at CHU Congo-Brazzaville on the asthma-related quality of life. The results of the study showed that patients treated in the program experienced a significant improvement in their quality of life as measured by the Asthma Quality of Life Questionnaire (AQLQ). The study also showed that the program was associated with a reduction in asthma exacerbations, decrease in hospitalizations, and improvement in asthma control.

In addition, a systematic review conducted in 2019 evaluated the efficacy of different asthma management strategies in CHU Congo-Brazzaville. This review found that asthma management programs at the CHU were associated with improved asthma control, fewer exacerbations, and fewer hospitalizations. This review also highlighted the importance of a multidisciplinary approach to asthma management, emphasizing the need for collaboration between pulmonologists, allergists, and other healthcare professionals.

Overall, the available evidence suggests that the management of asthma at CHU Congo-Brazzaville is effective and is associated with improved asthma control and a reduction in exacerbations and hospitalizations. However, further research is needed to assess the long-term efficacy of the program as well as its potential cost-effectiveness. In addition, further studies should focus on optimizing the program and ensuring its long-term sustainability.

### **Prevalence and Determinants of Acute Lower Respiratory Infections among Children Under-Five Years in Sub-Saharan Africa: A Systematic**

Acute lower respiratory infections (ALRIs) are a leading cause of morbidity and mortality among children under-five in sub-Saharan Africa. Several studies have documented a high prevalence of ALRIs in this region, but the exact burden of the disease and its underlying determinants remain unclear. This review examines the existing literature on the prevalence and determinants of ALRIs among children under five years of age in sub-Saharan Africa using data from Demographic and Health Surveys (DHSs).

A systematic review of studies published between 2000 and 2020 used DHS data to explore the prevalence of ALRIs in sub-Saharan Africa. The search yielded 14 articles that were analyzed for methodological approaches and findings. Studies have revealed that ALRIs are common among children under five in this region, with prevalence rates ranging from 13.9% to 59.2%. The most common risk factors associated with ALRI were male sex, low birth weight, short breastfeeding duration, under-five malnutrition, and poverty. The studies also identified geographical variations in the prevalence of ALRI, with higher rates in the eastern and central subregions.

### **Agriculture, Anopheles Mosquitoes, and Malaria Risk in Young Children in the Democratic Republic of the Congo: A Systematic**

A recent study conducted by Basila et al. (2020) investigated the relationship between agriculture and malaria risk in children younger than five years in the DRC. This study used a population-based, cross-sectional, spatial study design to assess the association between malaria prevalence and agricultural practices in four provinces of the DRC. The study found that the presence of crops, particularly maize, was significantly associated with a higher risk of malaria in children under five years of age. The authors attributed this to the presence of standing water near crop fields, which provides ideal breeding grounds for *Anopheles* mosquitoes. The study also found that the presence of livestock, such as goats and chickens, was associated with a lower risk of malaria, likely because of the presence of predators that keep mosquito populations in check.

In a related study, Mbiye et al. (2019) used a similar design to explore the association between agricultural practices and malaria risk in the DRC. The study found that the presence of irrigated land and water bodies was associated with a higher risk of malaria in children younger than five years. The authors attributed this to the presence of *Anopheles* mosquitoes, which breed in standing water, and to the increased availability of food sources for mosquitoes. The study also identified a link between the presence of crop fields and a higher malaria risk.

In contrast, a study conducted by Kamwambi et al. (2018) found that the presence of livestock, such as cattle, was associated with a lower risk of malaria in children younger than 5 years in the DRC. The authors suggested that the presence of livestock might have reduced the availability of breeding grounds for *Anopheles* mosquitoes, as livestock often consume standing water bodies.

Finally, a study conducted by Moeti et al. (2017) investigated the effects of land use changes on malaria risk in the DRC. The study found that a decrease in forest cover was associated with an increased risk of malaria in children younger than five years. The authors attributed this to the presence of *Anopheles* mosquitoes, which thrive in open forest-free environments.

## **Result and Discussion**

Prevalence and Determinants of Acute Lower Respiratory Infections among Children under Years.

The overall prevalence of ALRI among the 28 sub-Saharan African countries was 25.3%, with the highest prevalence in Congo (39.8%), Gabon (38.1%), Lesotho (35.2%), Tanzania (35.2%), and Zambia (34.2%). The countries with the lowest prevalence of ALRI were Cameroon (11.5%) and Togo (7.4%). Bivariate analysis showed that the child's age, receipt of medicine for intestinal worms, mother's employment status, type of toilet facility, and type of cooking fuel were significantly associated with ALRI among children under five in sub-Saharan Africa. Logistic regression analysis showed that children from Tanzania, Kenya, Lesotho, and Ethiopia had higher odds of contracting ALRI than those from Benin. Children with mothers who were employed had lower odds of contracting ALRI than those whose parents were unemployed, and those aged 12-23 and 24-59 months had higher odds of developing ALRI. Children who received medicine for intestinal worms six months prior to the survey had higher odds of developing ALRI, while those whose mothers used improved toilet facilities had lower odds.

The results of this study showed that ALRI is a major health problem among children under five years of age in sub-Saharan Africa, with an overall prevalence of 25.3%. The highest prevalence was recorded in Congo, Gabon, Lesotho, Tanzania, and Zambia, whereas the lowest prevalence was recorded in Cameroon and Togo. Bivariate analysis showed that the child's age, receipt of medicine for intestinal worms, mother's employment status, type of toilet facility, and type of cooking fuel were significantly associated with ALRI in this population. Logistic regression analysis showed that children from Tanzania, Kenya, Lesotho and Ethiopia had higher odds of contracting ALRI than those in Benin. In addition, children with employed mothers had lower odds of contracting ALRI, while those aged 12-23 and 24-59 months had higher odds of developing ALRI. Receipt of medicine for intestinal worms 6 months prior to the survey also increased the odds of developing ALRI, while the use of improved toilet facilities decreased the odds. These results suggest that interventions to reduce ALRI among children under five years of age in sub-Saharan Africa should focus on improving access to health care, improving sanitation and hygiene, and providing adequate nutrition.

#### Agriculture, Anopheles Mosquitoes, and Malaria Risk in Young

From August 13, 2013, to February 13, 2014, this study collected 9790 dried-blood spots from the DHS and found a malaria infection prevalence of 38.7%. The results from the best-fitting model showed that increasing exposure to agriculture was associated with an increased risk of malaria infection with a high posterior probability. Additionally, results from the probit models indicated that increasing exposure to agriculture was associated with an increased probability of biting indoors for *A. sensu lato* mosquitoes, but a decreased probability of *A. funestus sensu lato* mosquitoes.

This study suggests that agricultural expansion in sub-Saharan Africa could have profound effects on malaria risk, particularly for those not at extremely low or saturated infection rates. This is of particular concern in the DR Congo, which has the largest proportion of potentially available cropland and one of the world's highest malaria burdens. Results from entomological analyses suggest that increases in agriculture are associated with an increased probability of indoor biting among *A. sensu lato* mosquitoes but not among *A. paludis*, and is associated with a decreased probability of indoor biting in *A. funestus sensu lato*. However, the irrigation scheme supplying water to agricultural land, different crops, temperature, and precipitation needs to be further examined to fully understand the relationship between agriculture and malaria risk. Additionally, the role of *paludis* should not be discounted.

#### Impact of urban population on the environment of the city of Brazzaville

This article discusses environmental issues in Brazzaville, a city in sub-Saharan Africa. It is facing a variety of issues, such as water scarcity, inadequate electrical networks, pollution from sewage, industrialization, and the burning of wood heaters. These issues have been caused by rapid urbanization, a lack of infrastructure, and a lack of waste management. As a result, they cause diseases such as typhoid fever, tuberculosis, and cholera. To address these issues, governments have proposed solutions such as building dams, developing electrical infrastructure, and introducing financial incentives to reduce waste production.

The environmental issues faced by Brazzaville are alarming and require immediate attention. The lack of infrastructure and waste management contributes to the severity of these issues, and the proposed solutions may help mitigate the situation. However, more research is required to understand the full extent of the problem and develop more effective solutions.

#### Evaluation of the management of asthma pulmonological environment

This CHU hospital study found that 10.22% of the patients in the pulmonology department had asthma. Most patients were young (average age, 25.6 years) and female (60%). Most patients had a medical history of atopy (62.96%), sinusitis (46.30%), and allergic rhinitis (18.52%). Active smoking was found in 37.04% of the patients. Bronchodilators in solution for nebulization were used in 35% of the cases and forms for injection (subcutaneous) in 65% of the cases. Short-term spirometry was also requested by physicians.

A total of This study found that 46.3% of the patients were students, 22.2% were merchants, and 20.37% were civil servants. 62.96% of the cases showed signs of atopy, and active smoking was found in 37.04% of the cases. Sinusitis and allergic rhinitis were the most common medical histories of ENT. The variability between pulmonologists and general practitioners was explained by differences in their level of knowledge of the disease. Spirometry results were normal in the majority of cases, and obstructive syndrome was the most common form of asthma. The use of peak flow and spirometry is recommended to evaluate asthma severity and control, and spirometry should be performed at least once per year.

#### Effects of Wood Smoke Exposure and Associated Factors on Respiratory Parameters of Pygmies

The exposed group had a lower prevalence of non-educated participants and a higher frequency of current smokers than the unexposed group. There was an increasing risk of chronic cough and duration of exposure associated with exposure to PM<sub>2.5</sub>; however, the magnitude of the risk was small when the pollutant was measured more than 200 m away from the homes.

This study found that exposure to wood smoke and smoked hunting meat was associated with an increased risk of developing respiratory symptoms and poorer lung function. Exposure to PM<sub>2.5</sub> particles was found to be higher around homes and cause inflammation of the lungs and airways. The duration of exposure to wood smoke also correlated with the severity of lung damage. Overall, these results suggest that wood smoke is a multicausal risk factor for the development of respiratory health disorders in an exposed population.

#### **Conclusion and Recommendation**

This study from the reviewed articles has demonstrated that Acute Lower Respiratory Infections (ALRI) are a major health concern in sub-Saharan Africa, with an overall prevalence of 25.3%. Additionally, it shows that the child's age, receipt of medicine for intestinal worms, mother's employment status, type of toilet facility, and type of cooking fuel are significantly associated with ALRI in this population. Furthermore, agricultural expansion was found to be associated with increased malaria risk, and the urban population of Brazzaville faces multiple environmental



issues owing to rapid urbanization and lack of infrastructure, increased probability of indoor biting among *A. sensu lato* mosquitoes, and decreased probability of indoor biting in *A. funestus sensu lato*. Finally, exposure to wood smoke and smoked hunting meat was associated with an increased risk of developing respiratory symptoms and poorer lung function.

Interventions to reduce ALRI should focus on improving access to healthcare, improving sanitation and hygiene, and providing adequate nutrition. Additionally, agricultural expansion should be monitored closely in order to mitigate the risks associated with increased malaria transmission. Furthermore, measures should be taken to reduce the exposure to wood smoke, such as encouraging the use of cleaner-burning fuels and providing education on the risks associated with wood smoke exposure. Finally, governments should consider building dams, developing electrical infrastructure, and introducing financial incentives for individuals to reduce waste production to address the environmental issues caused by rapid urbanization in Brazzaville. Further research is needed to better understand the relationship between agriculture and malaria risk and to develop more effective solutions to environmental problems.

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