

Enhancing respiratory health access for women and children in Africa

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Abstract

Respiratory health is a relevant aspect that requires urgent attention in maternal and child health, especially in developing nations, such as Africa, where communicable and non-communicable respiratory health conditions pose a serious threat to such vulnerable populations compared to developed nations. Poor access to respiratory health access has worsened the situation in Africa. This article discusses the current state of respiratory health common among women and children (neonates and infants) in five nations used to represent the African region. This study reviewed published reports and studies relevant to achieving its aim. The review showed that Chronic Obstructive Pulmonary Disease (COPD), asthma, Respiratory Tract Infections (RTIs), and pneumonia were the common respiratory issues reported in Northern Africa (Egypt). Respiratory Distress Syndrome (RDS), chronic bronchitis, chronic hypoxia in the placenta, asthma, and respiratory symptoms such as nasal allergies and shortness of breath were the most common respiratory problems emanating from Western Africa, specifically Nigeria. COPD, pulmonary disturbances, and respiratory infections were common in Central Africa, specifically the Democratic Republic of Congo. Acute Lower Respiratory Infections (ALRI), pneumonia, and COPD were reported in Eastern Africa (Ethiopia). In Southern Africa (South Africa), the following conditions have been identified: Respiratory symptoms (wheezing and chest tightness) in children, respiratory syncytial virus infections, and acute impairments in lung function due to early-life lower respiratory tract infections. This article also discusses how respiratory issues affect maternal and child health. Furthermore, information about how enhancing respiratory health access will contribute to attaining sustainable development goal 3 (Good health and well-being for all), promoting universal health coverage, and strengthening primary healthcare systems were discussed. It also shows how respiratory health access is related to maternal healthcare-seeking behaviour and offers evidence-based recommendations to improve respiratory healthcare access among maternal and child health in Africa. It is concluded that an urgent

need exists for enhanced healthcare policies and practices to enhance respiratory health access to improve maternal and child health outcomes in Africa. Policy interventions should be implemented to improve respiratory access for women and their children. Additionally, community-based approaches should be employed, and respiratory health should be integrated into existing maternal and child health frameworks.

Key words: Respiratory health; Women and children health; Reproductive health; Enhanced Healthcare access; Health-seeking behaviour; Sustainable development goal; Universal healthcare coverage; Strengthening healthcare system; Africa

INTRODUCTION

Respiratory health status is an important and overriding factor that has a significant bearing on maternal and child health, most especially in areas with poor health facilities (developing nations). Respiratory diseases such as Chronic Obstructive Pulmonary Disease (COPD) and asthma present significant risks to African women of childbearing years and infants.¹⁻³ Although COPD is often underreported in the continent, it is an emerging concern due to biomass smoke exposure and deficiency in diagnostic facilities.⁴ Women also have an enhanced susceptibility to biomass smoke exposure while cooking food in poorly ventilated kitchens, which has enormously upsurged respiratory diseases amongst them despite having lower smoking rates compared to men.^{4,5} In Africa, the COPD prevalence rate is between 4.1% and 24.8%, which is largely dependent on the diagnostic technique employed.⁴ Despite this, many African healthcare systems lack the capacity to effectively address respiratory issues, such as COPD, asthma, pneumonia and many others.¹⁻⁵ Insufficient monitoring and limited diagnostic tools like spirometry have led to numerous cases being undetected and untreated.⁶ Moreover, household air pollution from solid fuels remains a significant risk factor, particularly in rural areas, emphasising the requirement for targeted interventions and policies to minimise this exposure.⁷ The COVID-19 pandemic has further expounded the inadequacies in healthcare systems across the length and breadth of the African continent. It has aptly indicated that there is, in fact, a growing need for improving respiratory health. Cardiopulmonary rehabilitation services have been well-established in the Middle East and the North African region to improve lung function, muscle strength, and general quality of life of patients in need of such support, such as survivors of COVID-19.² Cardiopulmonary rehabilitation, pharmacological treatments, behavioural

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modification, vaccination, nutrition, telemedicine and strengthening capacities of health systems in responding to infectious and non-infectious respiratory diseases are integral for enhancing respiratory health access options for mothers and their children, specifically in Africa.⁸⁻¹¹ This article aims to evaluate the current state of respiratory health access for maternal and child populations in Africa, focusing on the impact of non-communicable respiratory conditions. By analysing available data, the study will offer insights for healthcare stakeholders to identify opportunities for improving healthcare access and formulating policies to reduce respiratory health risks for this vulnerable group.

DISCUSSION

Current Status of Respiratory Health Access in Africa

This section discusses the current status of respiratory health access in Africa. To ensure a good representation of Africa, quality research studies and the most recent demographic health survey were obtained from the five countries in the 5 African regions of Northern Africa (Egypt), Western Africa (Nigeria), Central Africa (Democratic Republic of Congo), Eastern Africa (Ethiopia), and Southern Africa (South Africa).

Northern Africa (Egypt): Maternal and child health indicators in Egypt have shown achievements and persistent challenges based on their Demographic Health Survey report. The recent demographic health survey shows that the maternal mortality rate in Egypt stands at 239 deaths per 100,000 live births, while the maternal mortality ratio is 83 deaths per 100,000 live births.¹² Infant mortality is recorded at 33 deaths per 1,000 live births, with neonatal mortality at 20 per 1,000 live births.^{12,13} These vulnerable populations continue to stand a higher risk of contracting respiratory diseases despite advancements in healthcare access. The following review examines various studies and articles to provide insight into the current state of respiratory health access in Egypt. El-Essawy, et al. research focussed on the prevalence of COPD among women living in rural areas of the Fayoum Governorate.¹⁴ The study showed that COPD is associated with exposure to biomass fuel instead of smoking, which is often reported in developed nations.¹⁴ In the comparison between biomass-exposed women cooking and women who were not exposed to biomass fuel, the study showed that women who used biomass fuels for cooking and heating exhibited significant respiratory impairments compared to those who did not. In summary, the study showed that prolonged exposure to biomass smoke is a highly associated factor in the development of COPD among non-smoking rural women in Fayoum Governorate. Hence, it was recommended that direct interventions be made towards the reduction of reliance on biomass fuel and the improvement of access to cleaner energy sources in rural areas of Egypt. Research by Osman et al. explored maternal cultural practices in Upper Egypt and their impact on neonatal health.¹⁵ The study determined the prevalence

of harmful traditional practices that impact neonatal health, such as delaying breastfeeding and using non-medical remedies for neonatal care. A significant proportion of poor neonatal outcomes were identified to be associated with neonatal mortality in the home environment.¹⁶ The study's findings suggested the need for public health interventions that educate and encourage mothers on best practices for newborn care, as that will help reduce neonatal mortality rates. In addition, Reda and Ruby examined the prevalence of Female Sexual Dysfunction (FSD) in Egyptian women suffering from asthma.¹⁶ The findings revealed that the majority (90%) of asthmatic women experienced FSD. The study showed that women with uncontrolled or severe asthma with lower educational levels and unemployed status showed a significant risk associated with FSD. This relationship between respiratory health and overall well-being reported by Reda and Ruby emphasised the relevance of comprehensive healthcare services in addressing both physical and psychological aspects of chronic respiratory diseases in Egyptian women.¹⁵

El-Koofy et al. conducted an observational study on Respiratory Tract Infections (RTIs) among children under five years old in Egypt.⁹ The study showed a high rate of both upper and lower RTIs among those children. Malnutrition then appeared as one of the major risk factors for the development of lower respiratory tract infections LRTIs among rural children in Egypt. This was in agreement with the fact that better nutritional and healthcare services are urgently required to prevent such respiratory infections to protect young children, the leading causes of illness and death among young children.⁹ Al-Ajlouni et al. conducted research into the role that Cardiopulmonary Rehabilitation (CR) would play in the management of diseases such as COPD, congestive heart failure, and post-COVID-19 complications within the MENA region, which includes Egypt.² The study identified that CR is an important technique for improving the patient's physical and psychosocial disposition. However, the study reported inadequate infrastructure, healthcare staff shortage, and culture as factors in the application of the CR technique.² Although CR is accepted as an effective way of improving respiratory function, even in the post-COVID-19 period, attempts at embedding it into national healthcare have not proven adequate success. Solutions like telehealth and digital monitoring tools are needed to facilitate access to CR, particularly in those areas where resources are scarce.² A pathological investigation into the causes of sudden deaths among Egyptian children by Fnon et al. showed that most deaths were due to complications from prematurity and infections, especially in the neonatal period.¹⁷ In most instances, the infection presented was pneumonia, a further manifestation of how respiratory diseases have a dismal effect on child health in Egypt.¹⁷ These findings point out the need for improving neonatal care and infection control practices to avoid respiratory and other infectious diseases that cause death in early childhood. In summary, Egypt has made great strides in reducing maternal and infant

mortality, though respiratory health challenges, especially among rural women and children, remain a pertinent issue. From exposing rural women to injurious biomass fuels, which has enhanced the association with COPD, to the significant gap in cardiopulmonary rehabilitation services to the high burden of asthma, respiratory tract infections, and pneumonia among children, respiratory health access is a critical frontier of improvement. Therefore, relevant interventions that focus on upgrading the healthcare structure, public education, and access to state-of-the-art medical practice, particularly in underprivileged regions, are required.

Western Africa (Nigeria): Nigeria is currently facing major public health issues, particularly in the areas of maternal and infant healthcare. Recent demographic data indicates a high maternal mortality rate of 576 deaths per 100,000 live births, with a maternal mortality ratio of 512 deaths per 100,000 live births.¹³ Further, the infant mortality rate is reported at 67 deaths per 1,000 live births, while the under-five mortality rate stands at 132 per 1,000 live births, showing that over 1 in 8 children in Nigeria do not live past their 5th birthday.¹⁸ The neonatal mortality rate, which measures deaths occurring within the first 28 days of life, is 34 deaths per 1,000 live births.¹⁹ According to these statistics, there is a necessity for improved healthcare services, such as greater access to respiratory care, considering the substantial burden of respiratory illnesses among such vulnerable groups in Nigeria. The following discussion reflects the findings of several studies investigating the current status of respiratory health access in Nigeria. Umoh et al. conducted a study on the impact of chronic bronchitis on the mental health of women in a fishing community in the Niger Delta.²⁰ It was identified that the community relied heavily on firewood for fish preservation. The research also showed that women who were exposed to biomass smoke had a higher likelihood of developing chronic bronchitis, which was closely connected to psychological distress such as anxiety and depression.²⁰ These findings demonstrate how respiratory conditions affect individuals' physical and mental well-being, particularly those caused by environmental factors like biomass smoke, which can adversely affect both the physical and mental well-being of individuals, especially in vulnerable communities. In addition, Dutta et al. investigated the detrimental effects of Household Air Pollution (HAP) on pregnant women in Nigeria.²¹ The authors compared the impact of traditional biomass fuels (firewood and kerosene) and ethanol cookstoves on women, revealing that exposure to biomass smoke is associated with long-term oxygen deficiency in the placenta. This condition, which is marked by increased Hobauer cells, syncytial knots, and chorionic vascular density, poses significant risks to the health of both the mother and the child, raising the chances of complications such as preeclampsia and restricted foetal growth.²¹ The study underscores the importance of implementing cleaner cooking technologies to mitigate the respiratory health hazards linked to HAP in Nigeria.

Other studies have also reported other respiratory health issues affecting maternal and child health. For example, Desalu et al. conducted a study to determine the prevalence of asthma and respiratory symptoms among pregnant women in Ilorin, Nigeria.¹ The findings highlighted that while asthma prevalence was relatively low at 2.1%, respiratory symptoms such as shortness of breath and nasal allergies were more frequent, affecting up to 12.9% of participants.¹ Women with asthma experienced aggravated symptoms during pregnancy, raising concerns for both maternal and foetal health.¹ The study recommended that improving asthma management and controlling respiratory symptoms is necessary for minimising respiratory-related complications and reducing associated risks during pregnancy. Another study supporting the subject matter is the study by Akuirene et al., whose study focused on the incidence of respiratory distress among pregnant women and newborns in Delta State, Nigeria.²² The study observed that Respiratory Distress Syndrome (RDS) is one of the leading causes of neonatal illness, impacting nearly half of newborns. It also highlighted several preventable factors, such as inadequate prenatal care and poor labour management, which contribute to the increased rate of neonatal mortality.² The authors focused on how limited resources in Nigeria's healthcare system, such as insufficient material and financial support, intensified the problem, making it challenging to provide adequate care for both mothers and newborns at risk of respiratory distress. Therefore, addressing these respiratory health issues is integral to improving maternal and child health outcomes in Nigeria. David and Tobin-West offered insights that may also affect maternal and child health respiratory access in Nigeria. The authors reported complex challenges limiting access to reproductive healthcare services in Nigeria.¹³ Challenges identified that affect reproductive healthcare access include socioeconomic, cultural, and systemic barriers. As these factors impact the quality and access of healthcare services in the nation, they may also affect respiratory care for women of reproductive age. The authors argue that addressing these systemic obstacles could greatly improve health outcomes for both mothers and newborns, notably by expanding healthcare access in regions where services are limited. In summary, Nigeria faces significant challenges in addressing respiratory health, particularly for women and newborns. The maternal and child population faces a range of respiratory health problems, including Respiratory Distress Syndrome (RDS), chronic bronchitis, chronic hypoxia in the placenta, asthma and respiratory symptoms. Factors such as household air pollution, inadequate asthma control during pregnancy, and insufficient healthcare resources contribute to the high prevalence of respiratory-related conditions. Improving access to respiratory healthcare through better infrastructure, cleaner energy solutions, and enhanced antenatal care is crucial for reducing the high maternal and neonatal mortality rates linked to respiratory conditions in Nigeria.

Central Africa (Democratic Republic of the Congo):

The Democratic Republic of the Congo (DRC) faces significant challenges in maternal and infant health, reflected in the alarming statistics in its most recent demography health survey. The maternal mortality rate is reported at 846 deaths per 100,000 live births, with a maternal mortality ratio of 554 maternal deaths per 100,000 live births.¹³ The infant mortality rate stands at 30.524 deaths per 1,000 live births, indicating a slight improvement of 2.04% from their previous report.²³ The neonatal mortality rate is equally concerning, recorded at 30 deaths per 1,000 live births, with rural areas facing a slightly higher rate than urban settings.²⁴ These statistics underscore the urgent need for improved healthcare access, particularly regarding respiratory health, which remains a critical yet often neglected aspect of healthcare in the DRC. The accessibility of respiratory health services in the DRC presents a multifaceted issue, characterised by varying degrees of success and persistent challenges. Research highlights several significant factors affecting respiratory health among different demographics, particularly vulnerable populations such as women engaged in certain occupations, environmental factors, wealth status, and access to maternal and child health services. A study conducted by Kabamba et al. examines the respiratory health of women selling cassava, corn, and soybean flour in Lubumbashi.²⁵ The findings reveal a notably higher prevalence of respiratory complaints among those exposed to dust compared to control groups. The study utilised standardised questionnaires and lung function tests, demonstrating that the Peak Expiratory Flow Rate (PEFR) was significantly lower in the exposed group, suggesting an urgent need for targeted interventions to improve respiratory health among these women. The research by Olonga-Lofuta et al. further highlights the occupational hazards faced by charcoal workers, who are at an elevated risk for Chronic Obstructive Pulmonary Disease (COPD).³ Their findings indicate a significantly higher prevalence of COPD among charcoal producers compared to farmers, suggesting a strong correlation between occupational exposure to charcoal smoke and respiratory diseases. The study emphasises the necessity of implementing health and safety regulations in the charcoal production industry to protect workers' respiratory health. Regarding environmental factors, Longombe et al. investigated the environmental factors impacting respiratory health, focusing on the use of charcoal and firewood for cooking and heating.⁵ The study reveals that nearly a third of the global population relies on biomass fuels, which can lead to indoor air pollution when combustion is incomplete.⁵ In the DRC, the scarcity and high costs of electricity and natural gas compel many households to use these harmful energy sources, exacerbating respiratory health issues. The study findings indicate that a substantial proportion of women using charcoal experienced pulmonary disturbances, emphasising the need for strategies to mitigate indoor air pollution and enhance air quality.

When it comes to maternal and child health healthcare access, Fink et al. and Kandala et al. offered relevant

insights into that effect.^{26,27} Fink et al. explore the broader implications of health service access in the DRC, particularly concerning antenatal care.²⁶ Their analysis reveals a wealth-quality gradient, where socio-economic status significantly influences the quality of care received. Wealthier women tend to seek care at higher-quality facilities, even if they are further away, while poorer women face disparities in the quality of services, impacting maternal and child health outcomes, including respiratory health. Kandala et al. provided insight into the prevalence of respiratory infections among children in the DRC, highlighting how geographical factors influence health outcomes.²⁷ Their analysis of childhood morbidity indicates that respiratory infections are more prevalent in certain regions, with socio-economic factors playing a crucial role. Understanding these disparities can inform targeted health interventions aimed at improving respiratory health for children in the DRC. In summary, the current state of respiratory health access of women and children in the Democratic Republic of the Congo is complex and multifaceted, influenced by environmental, occupational, and socio-economic factors. They face a range of respiratory health problems, including Chronic Obstructive Pulmonary Disease (COPD), pulmonary disturbances, and respiratory infections, which are associated with their type of occupations, environmental factors, wealth status and access to maternal and child health services. Addressing these challenges requires a comprehensive approach that includes improving healthcare access, enhancing environmental conditions, and implementing targeted interventions for vulnerable populations.

Eastern Africa (Ethiopia): In Ethiopia, maternal and infant healthcare access has contributed to the burden of maternal and child morbidity and mortality. The maternal mortality rate stands at 412 deaths per 100,000 live births, with a maternal mortality ratio of 353 maternal deaths per 100,000 live births.^{13,28} Additionally, the infant mortality rate is reported at 48 deaths per 1,000 live births, while the neonatal mortality rate is 28 deaths per 1,000 live births, which disproportionately affects those in rural areas and poorer households.^{28,29} The above statistics can be linked to respiratory health issues. For example, Tamire et al. found that exposure to harmful indoor air pollutants significantly affects the lung function of women, particularly those using solid fuels for cooking.³⁰ Their study revealed that women in rural settings are more susceptible to respiratory symptoms, highlighting a critical link between household practices and health outcomes. Furthermore, the high prevalence of respiratory issues among mothers with young children was corroborated by Andualem et al. who reported that nearly half of the mothers surveyed experienced acute respiratory symptoms.³¹ Factors such as fuel type and environmental conditions were significantly associated with these health challenges. The management of severe pulmonary hypertension in pregnancy, as reported by Hailu et al. also reveals respiratory health challenges specific to maternal health.³² Women with this condition face heightened risks,

including increased maternal mortality, indicating that respiratory complications are critical factors in maternal care. Other studies have supported that respiratory health issues in the nations have impacted maternal and child health outcomes in the nation. The study by Balidemaj et al. provided a quantitative analysis of the health burden attributable to household air pollution, estimating that a substantial portion of the population in Adama relies on solid fuels, leading to increased mortality from respiratory diseases like Acute Lower Respiratory Infections (ALRI) and Chronic Obstructive Pulmonary Disease (COPD).³³ This highlights the urgent need for interventions to reduce reliance on polluting fuels and improve overall health outcomes for women. Yallew et al. focused on pneumonia in children under five, noting that this condition remains a leading cause of hospitalisation and death in this age group.³⁴ The prevalence of pneumonia admissions emphasises the broader public health implications of respiratory diseases in Ethiopia, particularly for vulnerable populations. Lastly, Tola et al. examined post-mortem findings in preterm infants, identifying respiratory disorders as significant contributors to neonatal mortality.³⁵ Their findings underscore the need for enhanced respiratory health measures in neonatal care. In summary, the current status of respiratory health access in Ethiopia is dire, characterised by various issues, including household air pollution, inadequate healthcare access, and high rates of pneumonia, Acute Lower Respiratory Infections (ALRI) and Chronic Obstructive Pulmonary Disease (COPD). Women and children face heightened risks, and social and environmental factors compound the impact of these health challenges. Addressing these respiratory health issues is essential to improving the region's maternal and child health outcomes.

Southern Africa (South Africa): In South Africa, the maternal mortality rate stands at 219 deaths per 100,000 live births, while the maternal mortality ratio is recorded at 141 maternal deaths per 100,000 live births.¹³ According to the current demographic health survey of South Africa, an infant mortality rate of 35 deaths per 1,000 live births and a neonatal mortality rate of 12 deaths per 1,000 live births has been documented.³⁶ During the five years preceding the latest survey, the under-five mortality rate was 42 deaths per 1,000 live births.³⁶ Alarmingly, about one in every 24 children does not reach their 5th birthday, with 83% of these deaths occurring within the first year of life. Investigating the impact of respiratory health issues on maternal and child health becomes relevant, as shown in existing studies. One such study is the study by Le Roux et al. which focused on the incidence and severity of childhood pneumonia, a leading cause of morbidity and mortality in South Africa.³⁷ Their study reveals that pneumonia incidence is notably high among infants despite the implementation of a robust immunisation program.³⁷ The identification of maternal HIV status, smoking, and malnutrition as risk factors for increased pneumonia incidence indicates the need for targeted public health interventions to improve respiratory health outcomes for children. Also, Misra et al. investigated

the relationship between household fuel use and respiratory health among rural South African women.³⁸ Their findings indicate that there is a higher likelihood of self-reported respiratory symptoms, such as wheezing and chest tightness, among women using wood as a cooking fuel compared to those using electricity. Although the study found limited evidence linking fuel type to inflammatory biomarkers, it suggests that reliance on biomass fuels may still pose respiratory health risks. This highlights a critical area where improved access to cleaner energy sources could alleviate respiratory issues in rural communities. In addition, Zar et al. examined the epidemiology of Respiratory Syncytial Virus (RSV) infections, emphasising the prevalence of RSV LRTI in infants.³⁹ The research reveals that early-life RSV infections can have lasting effects on lung health, highlighting the importance of timely interventions to prevent and manage respiratory illnesses in young children. Moreover, Muttoo et al. explore the effects of short-term exposure to ambient air pollutants on lung function in infants.⁴⁰ Their findings suggest that exposure to Particulate Matter (PM10) is linked to acute impairments in lung function, underscoring the significant impact of environmental factors on respiratory health in low-socioeconomic settings.⁴⁰

Other studies, such as Zar et al. and McCready et al. offered relevant information that will help in the understanding of the current status of maternal and child health in South Africa.^{41,42} Zar et al. focused on the role of *Klebsiella pneumoniae* in lower respiratory tract infections, showing that it contributes significantly to LRTI episodes in infants.⁴¹ The association between *Klebsiella* infections and prematurity, HIV exposure, and lower birth weight indicates that efforts to strengthen healthcare strategies for these high-risk groups are crucial for improving respiratory health outcomes. McCready et al. examined the determinants of lung function development from birth to five years of age, highlighting the detrimental effects of early-life Lower Respiratory Tract Infections (LRTI) on lung development.⁴² The study emphasises the importance of addressing these early respiratory issues to prevent long-term health complications, advocating for public health strategies that target risk factors associated with respiratory illnesses in infants.⁴² In summary, the current respiratory health access status in South Africa is marked by various challenges. Key respiratory issues include high incidences of childhood pneumonia, respiratory symptoms (such as wheezing and chest tightness), Respiratory Syncytial Virus (RSV) infections, and acute impairments in lung function due to early-life Lower Respiratory Tract Infections (LRTI). Addressing these issues through targeted public health initiatives, improved access to healthcare services, and environmental policies is essential for enhancing respiratory health outcomes in Southern Africa.

The Impact of Respiratory Diseases on Maternal and Child Health

Maternal health and respiratory conditions: Maternal

health and respiratory conditions encompass a thorough study regarding how motherhood-related factors, such as body mass index, exposure to environmental pollutants, and work hazards, affect respiratory health in mothers and their offspring. This discussion is grounded in a purposive selection of studies placing emphasis on the interplay between maternal health and respiratory conditions with a call for attention to various risk factors and their implications for health. Warmington et al. in their scoping review, investigated the association between maternal BMI during pregnancy and the risk of respiratory infections in offspring.⁴³ A systematic review of literature from several leading databases found that high maternal BMI is associated with increased risks of respiratory infections during childhood. While only a limited number of cohort studies met their criteria, more than 85% of those studies showed that an elevated maternal BMI may independently influence the risk of respiratory infections in children, once again underlining the relevance of maternal health to long-term respiratory outcomes. They concluded that further large-scale studies are needed to clarify these relationships and to advocate for targeted interventions addressing maternal BMI during pregnancy as a means of improving child health. A study by Elsiwi et al. focused on maternal exposure to pyrethroid insecticides and its possible relation to respiratory allergy symptoms in children.⁴⁴ This study, using Indoor Residual Spraying (IRS) for malaria control, identifies that high levels of maternal urinary metabolites of pyrethroid exposure are significantly associated with increased risks of doctor-diagnosed asthma and wheezing, among other respiratory problems in preschool children. These results underpin the awareness of regulating chemical exposure even during pregnancy in malaria prevention and control, for such exposures have adverse effects on respiratory health in children. Madhi et al. evaluated the burden of Respiratory Syncytial Virus (RSV) infection during pregnancy, particularly in those coinfected with HIV.⁸ They detected the incidence of RSV infection during and after pregnancy to be high in both HIV-infected and uninfected women, with common respiratory symptoms such as cough, rhinorrhea, and sore throat. These findings support the fact that vaccination against RSV may prevent not only maternal health outcomes but also neonatal ones, which calls for more emphasis on infectious respiratory diseases in pregnant women. Tamir et al. explored household air pollution as a risk for respiratory health in Ethiopian women.³⁰ They established that in their study exposure to solid fuels for cooking purposes was associated with an increased risk of developing symptoms of respiratory health and impaired lung function compared with those using cleaner fuel sources. This study brings into perspective the influence of environmental factors on maternal respiratory health in sub-Saharan Africa and suggests that improvements in fuel sources and cooking practices should be considered to enhance maternal and child health outcomes. Andualem et al. studied acute respiratory symptoms among mothers with young children in northwest Ethiopia.³¹ The

prevalence was found to be 46.1%. Respiratory symptoms were related to the quality of air, and fuel type used inside households, and workplaces. Andualem et al. stresses the need for targeted interventions to improve air quality and reductions in exposure to harmful air pollutants among households with mothers having young children.³¹ Further contributing to this discourse, Kabamba et al. assessed respiratory complaints among women working in the sale of grain flour in the Democratic Republic of Congo.²⁵ The investigation revealed that respiratory complaints were significantly higher in the group of women exposed to flour dust compared to the control group. A similar study was conducted by Olenga-Lofuta et al. which focused on occupational exposure to smoke from charcoal; an increased prevalence of COPD among charcoal workers compared to farmers was recorded.³ Such studies illustrate the occupational hazards that have been contributing to respiratory health among women and point to the use of protection equipment at workplaces. In summary, the interlinks between maternal health and respiratory conditions are multifactorial, stemming from maternal BMI, exposures to environmental toxins, household air quality, and occupational hazards. The above studies have suggested that maternal health exerts a major influence on respiratory outcomes for mothers and their children. Some of the critical respiratory issues identified by these studies include childhood respiratory infections, asthma, wheezing, RSV infections, respiratory symptoms due to household air pollution, and chronic obstructive pulmonary disease. These require policy changes, public health initiatives, targeted research for improvement in respiratory health among mothers and children and behavioural changes among women.

Child health and maternal respiratory conditions: The interconnectedness of child health and maternal respiratory conditions is one of the most critical aspects of concern in global health, especially in low and middle-income settings. Zar et al. offer relevant insight as it shows how much impact RSV has on respiratory health during the early childhood years.³⁹ RSV is well recognised as the most common cause of severe LRTI during infancy; furthermore, certain infections are at risk of compromising long-term respiratory function, continuing into adulthood. This South African study followed the cohort from pregnancy into childhood between birth to two years of age. It demonstrated that RSV LRTI was very common, particularly among infants 0 month-6 months of age, and that affected children were three times more likely to suffer from recurrent LRTI than their age-matched peers who developed non-RSV infections.³⁹ This, therefore, calls for the importance of early detection and intervention strategies in order to reduce risks associated with RSV and other respiratory infections. Results from the Drakenstein study also point toward an alarming association between maternal health and child outcomes. Maternal respiratory illnesses, including chronic and acute, may adversely affect both fetal development and postnatal health. For example, maternal smoking, along with other risk factors, has been

linked to increased incidences of pneumonia in children, as evidenced by studies like that by Le Roux et al. who documented the cases of pneumonia in the first year of life among infants belonging to the same cohort.³⁷ Such evidence supports the belief that attention to maternal respiratory health is of utmost importance in improving respiratory health among children.

In addition, Yallew et al. recorded a high rate of pneumonia among under-five children, presenting the urgency of this condition in Ethiopia.³⁴ The study indicated that pneumonia accounted for 25.99% of admissions to hospitals in this age group and that there was a considerable mortality rate from complications of pneumonia. The retrospective nature of the analysis allowed evidence to show that the younger children were at especially high risk, particularly in months following heavy rainfall. This seasonal variation points to environmental factors that can exacerbate respiratory conditions, thus targeting the need for public health interventions in vulnerable periods. Also, Tola et al. showed conclusively that among causes of death related to respiratory conditions, preterm babies in Ethiopia have the highest fatality rate.³⁵ The authors also pointed out that post-mortem lung histological findings in neonates are critical to understanding the aetiology of respiratory failure. Hyaline membrane disease and pneumonia are prevalent conditions; thus, better maternal and neonatal care is called for to avoid these preventable causes of infant deaths. In summary, evidence from various studies highlights the interlinked circle between maternal respiratory health and child outcomes. Treatment of respiratory conditions in mothers has come out paramount for improvement in child health and reduction in pneumonia incidence among other respiratory conditions. It is thus important that public health strategies regard maternal health as a route to child health, with interventions supported by sound epidemiological data sensitive to the needs of the most vulnerable populations. Much more, public health policy and intervention actions need to be taken to minimise respiratory disease burden among mothers and children for better community health.

The Importance of Improving Respiratory Health Access

Achieving sustainable development goal 3 (Good health and well-being): SDG 3, which aims to promote healthy lives and well-being for all individuals, should be considered as respiratory health outcomes of women and children are among the components in the SDG. The following analysis shows the importance of enhancing respiratory health services, as they will contribute towards reducing maternal and child mortality rates in African nations; as such, nations are working towards ensuring that they meet the global health goal of SDG.¹³ In Africa, it has been reported that maternal and neonatal mortality rates are unacceptably high.⁴⁵ Pneumonia and asthma respiratory diseases have been reported to have contributed to pregnancy and childbirth-related complications. Achieving SDG 3.1, which

aims to decrease the global maternal mortality ratio to below 70 per 100,000 live births by 2030 in African nations, requires significant improvement in improving respiratory healthcare access.⁴⁵ Such improvement requires a robust healthcare system that has the ability to cater to the respiratory healthcare needs of vulnerable populations (women of reproductive age, neonates, and under-5 children).⁴⁵ Additionally, it is relevant to integrate respiratory health into healthcare programs or initiatives for mothers and their children. Postpartum respiratory infections are one of the severe infections that can have a severe impact on both mothers and their infants. Therefore, improving respiratory healthcare access or combining them in maternal and child health programs can help improve their health outcomes, which will contribute to achieving SDG 3.1.¹³ Despite the recognised connection between respiratory health and maternal/child mortality, numerous obstacles hinder access to quality care in various African countries. According to David and Tobin West, these obstacles that affect reproductive health include sociocultural factors, financial limitations, and inadequate healthcare facilities.¹³ Women, particularly those of reproductive age, often encounter compounded challenges due to gender disparities that limit their capacity to seek and obtain care. The factors identified above contribute to maternal and child respiratory health issues. Therefore, it is necessary to address such barriers to enhance the reproductive health and respiratory outcomes of the vulnerable population. Integrating Non Communicable Disease (NCD) prevention into maternal and child health programs offers a strategic approach to overcoming these barriers. Maina highlights that addressing NCDs-such as asthma and chronic obstructive pulmonary disease-within these initiatives can improve access to vital healthcare services.⁴⁶ By embedding respiratory health into existing maternal and child health frameworks, health systems can more effectively support vulnerable populations, thereby enhancing health outcomes.

The insights from the Serge et al. Atlas report reveal the disparities in healthcare access and outcomes across African nations.⁴⁵ Many nations (in developed nations) that have worked hard towards meeting the health-related SDGs have stronger health systems and effective policies. Improving healthcare systems in African nations, using targeted investments, retraining healthcare workers, and implementing robust policies that consider respiratory health will contribute to respiratory health access. Furthermore, it has also been shown that improving maternal health outcomes and achieving SDG 3 requires universal healthcare coverage promotion.¹³ This is so because enhancing healthcare access by ensuring that individuals access healthcare services without incurring financial hardships may contribute towards reducing respiratory health conditions that contribute to maternal and child morbidity and mortality rates. In summary, improving respiratory healthcare access is necessary for achieving SDG 3, which will reduce maternal and child outcomes in Africa. Removing barriers to respiratory health access and

integration into maternal and child health programs and strengthening health systems through robust policies are integral to achieving SDG 3. As Africa has complex issues affecting their healthcare systems, adopting a collaborative and transdisciplinary approach would be beneficial to create sustainable solutions that improve the health and well-being of all individuals, especially vulnerable women and children. Adopting coordinated efforts highlighted in this section will help African nations make significant progress toward achieving health-related SDGs by 2030, ultimately creating a healthier environment for future generations.

Promoting universal health coverage (UHC) in respiratory care: Promoting UHC can be beneficial in respiratory care, as it will help ensure individuals can access respiratory health services without impoverishing themselves. UHC is one of the key building blocks toward better global health; however, its successful application falls under several determinants, including socio-cultural, economic, and environmental factors. As identified by Collins et al. UHC is often understood as a health sector-focused initiative where the broader determinants of health poverty, education, and gender disparities, among others, are overlooked.⁴⁷ This focus needs to be widened if UHC is going to take these key social determinants into account for an equitable healthcare system that effectively improves access to respiratory health services. Respiratory diseases represent one of the most important health concerns globally. Besides that, care for the disease often requires more than usual health services. Appropriate management of chronic conditions like asthma and COPD requires coordination in prevention, treatment, and rehabilitation methods. Therefore, this implementation requires UHC to support the integrated health system that will connect respiratory care to maternal and child health programs and public health programs to mitigate environmental contributors such as air quality and smoking.¹¹ The implementation of UHC will need harmonisation and integration of investments at multiple levels. Collins et al. have made a case for UHC, transcending the traditional health sector, to include several determinants of health.⁴⁷ In the case of respiratory health, this would require emphasis on reducing air pollution, raising public awareness about respiratory health, and promoting a healthier life.

Furthermore, the development of inter-sectoral co-financing mechanisms can support these strategies. By aligning funding from various sectors, governments can ensure a holistic approach to respiratory health that addresses medical care and the environmental and social factors contributing to respiratory diseases. China's journey toward UHC, as discussed by Yip et al. provides important lessons regarding the challenges and possibilities for improving respiratory health access.¹¹ China has achieved certain successes in maternal and child health yet still faces its own fragmented system of care and rising costs that pose barriers to effective care for chronic diseases. This challenge must be met by a shift toward an integrated delivery system with

the centre of gravity on primary care, prevention-oriented, and incentivising providers for health promotion.¹¹ Moreover, considerable enhancement of health education and awareness of respiratory health can occur through the use of digital means. Updating the information content of campaigns on health, combined with the renewal of the technologies used to encourage healthier behaviours, will help countries shift the increasing responsibility to individuals for their respiratory health, reducing overall respiratory disease burdens. Good respiratory health access is very important towards attaining UHC and improving public health. In addition, the development of an integrated approach that considers respiratory care with all other health initiatives while addressing underlying social determinants can be conducted by governments as a result of building an equitable healthcare system. The UHC framework offers a valuable perspective for analysing and implementing strategies to promote respiratory health. As countries work toward their UHC objectives, prioritising respiratory health as an essential component of their health agendas will be crucial for fostering healthier populations and reducing health inequalities.

Strengthening primary healthcare systems to address respiratory health: Improving access to respiratory health services is needed, particularly by strengthening primary health care systems. A recent example is the COVID-19 pandemic, which has demonstrated once more how central primary care's role is in managing health crises and improving health outcomes. Strong primary health care does not only provide direct medical care but also works on the broader determinants of health affecting respiratory conditions. Teixeira et al. research describes the crucial role of structured primary healthcare systems.⁴⁸ Their study places particular emphasis on the case of Brazil's Strategy for Family Health (ESF). This initiative succeeded in mitigating some of the adverse consequences of the COVID-19 pandemic. Communities with higher coverage of ESF had much lower death rates from COVID-19 and other respiratory conditions. This may be explained by the increased healthcare at home and health promotion that is necessary for respiratory health issues, especially in emergency situations, which affect the entire population. Strengthening primary health means approaching health more conservatively, including respiratory illness. With a focus on early intervention and prevention, the burden and severity of respiratory illness can be reduced significantly. Achieving the above will actively create policies that will improve the management of chronic diseases like asthma and COPD, thus creating good health and low mortality rates. The only way to improve respiratory health is by properly addressing all obstacles to access to healthcare services. According to David and Tobin West, improving access to the minimum healthcare package requires overcoming financial, geographical, and cultural barriers.¹³ Mostly, financial challenges have been known to restrict people, particularly the low-income segment of the population, from accessing the required healthcare, including services relating to respiratory ailments. Besides,

geographical constraints also limit access in cases where there is a severely limited number of healthcare centres in rural areas.

Cultural factors can also impact the disposition of people seeking care for a problem that is stigmatised or misunderstood, such as respiratory problems. In this regard, community engagement should be promoted through culturally sensitive outreach and education in order to dispel misconceptions about respiratory health and to motivate individuals to seek necessary care. The research by Puja et al. explores healthcare problems dealing with disadvantaged women in developing countries; notably, financial constraints and ignorance impede access even to the most basic services.⁴⁹ A focus on menstrual and gynaecological pathologies has pointed out that focused intervention in such areas could enable overcoming more general healthcare problems for women. Technology can go a long way in facilitating healthcare access, more so among marginalised sections. The study by Puja et al. suggests that voice bots can be a very good tool in enhancing access to health care among less-privileged women in Bangladesh.⁴⁹ This technology provides information and support on health issues at any time, supplementing shortcomings in traditional healthcare systems. The use of voice bots may be beneficial because they are easy to interact with since their interface is already familiar to users who require health information. Primary health care has been considered as the first level of contact by a person requiring medical service in most African countries like Nigeria.⁵⁰ Improvement in primary health care would, therefore, significantly increase access to reproductive health among childbearing-aged women, a fact that has been proven by David and Tobin West.¹³ Technology can improve the scope of primary care services so that the respiratory health problems of women and children can be covered. Increasing access to respiratory health services is crucial for working on the burden of respiratory diseases and reducing health disparities. This calls for strengthening primary healthcare systems to attain this goal, like during the COVID-19 pandemic, through various successful strategies. Financial, geographical, and cultural barriers in accessing health care, coupled with innovative technologies like voice bots, make the health system more inclusive, sensitive, and responsive to the needs of everyone. These efforts towards improved respiratory health would mean that a comprehensive primary care structure grounds a foundation by equitably providing access to essential services to realise improved health outcomes and further Universal Health Coverage.

Respiratory Health Access and Healthcare Seeking Behaviour

Relationship between respiratory healthcare access and healthcare-seeking behaviour: Access to respiratory healthcare is closely connected to how individuals seek medical assistance, significantly affecting health maternal health, treatment effectiveness, and the overall healthcare

system. Recognising these connections is essential for enhancing healthcare delivery and ensuring that people pursue appropriate care for respiratory issues, ranging from common colds to serious ailments like pneumonia or COVID-19. A study conducted in Tehran by Keshvari et al. explored how individuals manage common cold symptoms.⁵¹ The study showed that a significant number of participants (42.1%) would immediately see a doctor, while others opted for self-medication (14.3%) or relied on traditional remedies (28.3%). The study underscored how various factors—such as confidence in one's health, understanding of the common cold, and socio-economic background—affect seeking medical help. Individuals who felt informed and self-assured about managing their health were more likely to access professional care, indicating that improving public awareness of respiratory conditions could lead to better healthcare utilisation and access.⁵¹ This finding is crucial, as it reveals that even minor conditions like the common cold can influence healthcare-seeking behaviour shaped by personal health beliefs and systemic elements. When individuals comprehend their symptoms and access trustworthy healthcare options, they are more inclined to utilise those services, alleviating pressure on healthcare systems.

Conversely, the qualitative research by Onchonga et al. during the COVID-19 pandemic highlighted how external circumstances can significantly impede healthcare-seeking behaviour, particularly for vulnerable groups like pregnant women.⁵² The fear of contracting the virus caused considerable delays in accessing necessary medical services. Personal experiences and socio-economic challenges, such as job losses and lockdowns, intensified these delays. This study illustrates that access to healthcare is not merely about availability but is also influenced by individuals' perceptions and experiences regarding safety and trust in healthcare services. The interaction of fear and misinformation during health crises can create significant barriers to accessing even essential care, underscoring the importance of context in healthcare delivery—especially during emergencies. This relationship becomes critical for respiratory health, as individuals may overlook respiratory symptoms due to concerns about COVID-19 exposure or misunderstandings about the risks associated with seeking care. Recognising the interplay between healthcare access and seeking behaviour can guide targeted interventions. This will require strategies that raise awareness of respiratory problems and trust in care-seeking behaviour. For instance, healthcare systems may provide education that describes symptoms and treatments and incorporate common fears and myths that keep people from seeking help. Additionally, community-based programs are needed to link individuals to healthcare resources to minimise access barriers. Healthcare systems would, therefore, only be able to facilitate timely care for respiratory complications among people by making reliable information available and making healthcare settings appear safe. Access to respiratory healthcare and health-seeking behaviour are interrelated in a complex manner and

are influenced by individual perception and socio-economic factors within broader public health circumstances. Health systems can be instrumental in promoting access to respiratory health services and ensuring timely treatment-seeking behaviour. Understanding this relationship is crucial for framing effective public health strategies, especially amid the challenges thrown up by health crises such as the COVID-19 pandemic. It will be achieved by increasing awareness and establishing safe and accessible healthcare environments that enable more effective promotion of health outcomes related to respiratory conditions in diverse populations.

Healthcare-seeking patterns among women with respiratory conditions: It is crucial to acknowledge healthcare-seeking behaviour among women with respiratory conditions in relation to factors such as socio-economic conditions, different geographic locations, and even cultural influences. This information becomes essential in crafting appropriate public health policies and strategies to meet the needs of women experiencing respiratory ill health. Ortiz et al. examined the experiences of Latinx and Indigenous Mexican caregivers residing in Colonias along the US-Mexico border.⁵³ These communities frequently struggle with inadequate infrastructure, including limited healthcare services, prompting caregivers to seek medical assistance across the border. However, geopolitical challenges often complicate access, especially for undocumented caregivers who may feel they have no option but to seek care in Mexico. This research highlights how geographic and structural vulnerabilities intersect to restrict healthcare options, compelling caregivers to navigate a complex landscape to address their children's respiratory health concerns. These findings point out the vital role of geography in determining health, with caregivers from these border areas continuing to confront a variety of environmental hazards and systemic obstacles to care. Improvement in health access is critical to addressing respiratory health issues faced by the children in these communities. Unless structural inequalities are looked into, health-seeking behaviour among women will continue to be limited. Another study by Praptiningsih et al. investigated healthcare-seeking behaviour for acute respiratory illnesses in Java, Indonesia.⁵⁴ Their research identified distinct care-seeking patterns between rural and urban communities. They found that 4% of participants sought medical attention for respiratory problems within 2 weeks of the survey, with urban residents more likely to visit private healthcare facilities, while those in rural areas tended to utilise government clinics. Differences influence these variations in healthcare-seeking behaviour, in availability, access, and perceived quality of care between urban and rural environments. This understanding of such differences is paramount in informing public health programs aimed at managing respiratory diseases, as targeted strategies that can meet the specific needs of each community can be executed. Public health programs, by recognising access and preference disparities in healthcare, can henceforth be better tailored to achieve better health outcomes for women with

respiratory conditions.

Further, Ngomi et al. studied the healthcare-seeking behaviours of urban residents in informal settlements of Nairobi.⁵⁵ Significant inequalities in healthcare-seeking were reported in seeking care for childhood illnesses. Key determinants identified included maternal age, employment status, and socio-economic status, influencing healthcare access. For example, about 16.6% of the children of mothers aged less than 20 years had diarrhoea, and thus, the very young and usually economically disadvantaged women may have higher obstacles to healthcare services. This study further reiterates the socio-economic determinants of health-seeking behaviour and calls for targeted interventions to resolve the marginalised groups' distinctive challenges. Among women with respiratory conditions, reducing such disparities will translate to better access to care and health outcomes, thereby enabling more equity in health care. Summarily, geographical placement, socio-economic status, and cultural dynamics all play significant roles in health-seeking behaviour among women with respiratory symptoms. Research has identified that marginalised groups face the greatest barriers to accessing appropriate care, hence the need for targeted public health interventions. These are highly complex issues in seeking health care and implementing strategies to improve access and awareness; it is, therefore, important to acknowledge them to realise better outcomes for women and their families affected by respiratory conditions. The approach must be comprehensive in addressing these issues for the realisation of equal healthcare access and enhancement of overall health among vulnerable populations.

Evidence based Recommendations to Improve Respiratory Health Access in Africa

Policy interventions for enhanced respiratory care: Targeted, evidence-based strategies are essential to improving access to respiratory health for mothers and children in Africa. The following recommendations support the best approaches to minimising respiratory health disparities in such settings and vulnerable populations.

1. Development of Culturally Relevant Healthcare Frameworks for Maternal and Child Health

Establishing frameworks addressing chronic respiratory diseases in Indigenous populations where the needs of maternal and child populations are relevant in Africa:

- Collaborative care models: Engaging mothers and local communities in the creation of healthcare strategies ensures that interventions are culturally appropriate and effectively target respiratory health needs. This could make health services more acceptable and utilised.⁵⁶
- Prioritising resource allocation: Resource allocation specifically for maternal and child health programs, especially in resource-poor settings, is paramount in improving access to respiratory care. This includes

dedicated funding for programs that directly address respiratory health for mothers and children.⁵⁶

2. Empowering Mothers through Health Education

and Increased Autonomy

Research has shown that maternal decision-making autonomy significantly impacts child health outcomes.⁵⁷ To bolster respiratory health among mothers and their children, consider these actions:

- Community health education programs: Initiatives that educate mothers about respiratory health, including common symptoms and the importance of seeking care, empower them to make informed health decisions for themselves and their children.⁵⁷
- Supporting decision-making autonomy: Fostering confidence and skills in mothers to navigate healthcare systems can improve their ability to seek timely care for respiratory issues. Financial empowerment initiatives can also help reduce barriers to accessing necessary health services.⁵⁷

3. Comprehensive Data Collection for Maternal and

Child Respiratory Health

Establishing alignment between health policies and data collection is vital for maternal and child populations:

- Strengthening health data systems: Developing robust data collection mechanisms for respiratory health indicators relevant to mothers and children is crucial. This includes tracking respiratory illnesses, access to healthcare, and treatment outcomes to inform effective policy-making.⁵⁸
- Leveraging data for targeted interventions: Data-driven approaches allow for identifying high-risk areas for respiratory diseases among mothers and children, enabling tailored interventions that directly address their specific needs and improve health outcomes.⁵⁸

4. Innovative Healthcare Delivery Models for

Maternal and Child Populations

Exploring innovative models of healthcare may contribute a lot to the better utilisation of the services for maternal and child health:

- Expanding telemedicine services: Promote increased access to telemedicine, in which mothers are connected with healthcare providers, to advance respiratory care in particular, in rural and underserved communities. Telehealth consultations improve timely diagnosis and treatment outcomes regarding respiratory conditions for both mothers and children.¹⁰
- Public private partnerships: Collaborating with private sector providers can significantly improve maternal and child healthcare delivery. PPPs can leverage additional resources and expertise to enhance the access and quality of respiratory health interventions.¹⁰

5. Targeted Interventions for Childhood Respiratory

Health

Socioeconomic factors affect childhood illnesses.⁵⁶ To successfully address respiratory health in children, the following are recommended:

- Community-specific approaches: It is essential to implement targeted interventions that cater to the unique needs of children in different communities. This includes enhancing living conditions, ensuring access to clean air, and addressing environmental risk factors contributing to respiratory diseases.⁵⁶
- Policy driven resource allocation for maternal and child health: The government should invest in health infrastructure that augments respiratory health among mothers and children. This entails improving facilities that offer prenatal and pediatric care to guarantee timely and adequate respiratory health services.⁵⁶

Improvement in the respiratory health of African maternal and child populations requires multi-sectoral intervention informed by evidence. The prioritised areas of culturally sensitive health care, education, and empowerment of mothers, as well as efficient use of data and innovative health care delivery models, may contribute significantly to improving the respiratory health of mothers and children. The recommendations offered by this study provide a wide framework for addressing high-priority respiratory health problems facing these vulnerable populations across the continent.

Community based approaches: Environmental factors such as energy poverty and pollution heavily influence respiratory health in Africa, especially among mothers and children. Recent research by several authors highlights the adverse effects of limited energy access, environmental pollution, and governance on respiratory health outcomes. This discussion outlines evidence-based recommendations focused on improving respiratory health access through community-centred strategies.⁵⁹⁻⁶¹

1. Improving Energy Access and Clean Cooking Methods

- The study by Pondie et al. estimated that in 34 countries in the sub-Saharan region of Africa, there was a negative association between energy poverty and respiratory health.⁵⁹ Mean energy poverty, which involves poor access to electricity and clean cooking fuels, strongly leads to respiratory diseases. Combating such a situation requires the following:
- Encourage clean energy alternatives: Community-based renewable energy options, including solar and biogas, are programs that should be established to prevent exposure to indoor air pollution that kills pregnant women and small children.
- Conduct community education initiatives: Training the community on the benefits of adopting clean cooking

technologies. This can include practical workshops and demonstrations showcasing alternative energy options that lessen dependence on traditional biomass fuels.

2. **Enhancing Health Education and Awareness**

Lemma et al. highlight a notable knowledge gap regarding COVID-19 among pregnant women, particularly vulnerable to respiratory complications.⁶⁰ To address this, the following strategies should be implemented:

- Focused health education campaigns: Community health outreach targeted at focusing pregnant women on respiratory health, the prevention of respiratory infections, and vaccinations. That approach would be effective if information was communicated based on local media and community leaders to extend outreach.
- Leveraging peer educators: Local peer educators may be used to provide training on respiratory health risks and prevention strategies. Peer-to-peer education increases acceptance and improves learning retention.

3. **Enhancing Governance and Environmental Regulations**

According to Okere et al. environmental degradation and governance quality impact women's economic participation.⁶¹ Effective governances also plays an important role in reducing pollution and improving respiratory outcomes:

- Reinforcing regulatory policies: Engage in policies that would more significantly advocate for clean air initiatives through strict regulation of pollution control. Engage in community governance to ensure people are responsible for policies reflective of their needs.
- Promoting gender responsive Policies: Policies that allow women to engage in managing the environment and tap into their knowledge where possible for heightened awareness on matters pertaining to the environment.

In summary, a multi-faceted, community-based approach to improving access to respiratory health for both mothers and children in Africa would include improved energy access, integration of health education, better governance, establishment of surveillance systems, and partnerships. This will best position relevant stakeholders to tackle the respiratory health challenges these two vulnerable populations face. The reviewed studies underscore the need for urgent action in relation to energy poverty and pollution impacts on respiratory health if better health outcomes are to be realised for mothers and children on the continent.

Integrating respiratory health into reproductive healthcare services: Integrating respiratory health within reproductive health services is vital for the improvement of maternal and child health in Africa. Respiratory conditions are among the diseases that commonly affect women and children. These are compounded further by sociocultural, geographical,

and other economic difficulties. This discussion presents evidence-based strategies aimed at enhancing the access of respiratory health services through integrated maternal and child health initiatives.

1. **Incorporating NCD Prevention into Maternal and Child Health Initiatives**

Maina emphasises the necessity of addressing NCDs in the context of maternal and child health.⁴⁶ By embedding respiratory health strategies into established programs, healthcare systems can more effectively meet the needs of at-risk populations. Key components of this approach include:

- Comprehensive care: Respiratory health education and prevention in the domain of maternal and child health services will make the service comprehensive and responsive to the manifold needs of women and children.
- Equitable resource distribution: This would involve allocating adequate funds and resources for integration at the right places in health programs, assuring equal care for women and girls.

2. **Improving Access through Education and Awareness**

David and Tobin West stressed that comprehensive reproductive health would play a major role in attaining the Sustainable Development Goals (SDGs).¹³ Raising awareness about respiratory health among women of reproductive age is paramount for fostering informed health decisions and better health outcomes. Strategies include:

- Community education initiatives: Health education should be implemented to make them more aware of respiratory health, particularly with regard to environmental aspects and the impact of NCDs on maternal and child health.
- Engaging local resources: Collaborate with local leaders and health providers to provide information and promote culturally relevant health-seeking behaviour in order to capture the trust of the community.

3. **Overcoming Geographic and Economic Barriers to Access**

The findings of Vestal et al. on healthcare access challenges in rural areas are relevant to maternal and child health issues in Africa.⁶² To improve access, the following strategies should be considered:

- Telehealth and mobile services: Telehealth technologies and mobile clinics should be provided to help link individuals to those services in far-flung areas for respiratory health with minimal need for long travels.
- Transportation solutions and referral systems: This includes developing community transportation systems and establishing appropriate referral systems that guarantee timely access to respiratory health services among women and children.

4. Enhancing Health Systems and Governance

Good governance and responsive healthcare systems provide the right environment for respiratory health improvements. According to Maina, addressing the systemic inequities is quite crucial.⁴⁶ Recommendations include:

- Policy advocacy: Advocate for health policies that focus on integrating respiratory health services into maternal and child health programs for total care.
- Frameworks for monitoring and evaluation: Frameworks for monitoring and evaluating the effectiveness of integrated health programs, specifically on respiratory health outcomes among women and children, should be developed. These will be helpful in future improvements and resource utilisation.

5. Community Involvement and Empowerment

Successful health initiatives require participatory action by the community. Al-Ajlouni et al. emphasised that overcoming cultural barriers to healthcare delivery is crucial.² Recommended strategies include:

- Empowering Women: Engage women in decision-making regarding health and community health programs to guarantee that the programs meet their needs and appeal to them.
- Building local capacity: Respiratory health training for community health workers allows the community to be better equipped to respond to health challenges.

Integrating respiratory health into maternal and child health programs in Africa is crucial for addressing the increasing burden of Non Communicable Diseases (NCDs) and improving health outcomes for vulnerable groups. Healthcare systems can enhance respiratory health services for women and children by incorporating evidence-based approaches that prioritise education, access, governance, and community engagement. This comprehensive approach not only enhances individual health outcomes but also contributes to society's overall well-being, aligning with global health goals and promoting equitable access to healthcare.

CONCLUSION

Improvement in respiratory health access is vital in Africa. The reviewed studies show that COPD, asthma, pneumonia, and respiratory infections are the common respiratory health issues affecting maternal and child health in the continent, which has contributed to the burden of non-communicable diseases and poorer health outcomes from the health indicators reported. It has also been shown that poor maternal healthcare-seeking behaviour is a contributing factor alongside environmental and behavioural factors (non-use of greener fuels in cooking) and poor health infrastructure. Improving respiratory health access among these vulnerable populations can help towards the achievement of good health and well-being for all (SDG 3), and UHC

(dependent on strengthening the primary healthcare systems). Increasing access to respiratory health services, such as Cardiopulmonary rehabilitation, pharmacological treatments, behavioural modification, vaccination, nutrition, telemedicine and strengthening primary healthcare systems are required to improve the health outcomes of mothers and their children. Therefore, policy strategies, community-based approaches, and the Integration of respiratory health services into current maternal and child health programs are significantly recommended in Africa. Ensuring the above will help contribute to healthier futures for mothers and their children, fostering a more equitable and thriving society.

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Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

All the authors consented to the publication of this article.

Availability of Data and Materials

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Competing Interests

The authors declare that there are no competing interests or other interests that might be perceived to influence the discussion reported in this paper.

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Authors' Contributions

Japheth David (D.J) Researched and wrote the article

Charles Tobin-West (CT) Major and final review of the article

Alexander Egbogu (E.A) Proofread and edited the article

Godspower Onyeso (O.G) Reviewed the article

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Chidimma Alex-Egbogu (A.C) Proofread the article

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