BREATHLESS IN MYANMAR: DETERMINANTS OF CHRONIC RESPIRATORY DISEASE IN LOW TO MIDDLE INCOME COUNTRIES

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Chronic diseases claim 41 million lives worldwide every year; 77% of these deaths occur in low to middle income countries, and 10% are related to respiratory diseases. This article explores the socioeconomic and political characteristics unique to Myanmar that exacerbate asthma, a common chronic respiratory disease and the 7th leading cause of death in Myanmar in 2019. Contributing factors include air pollution from rapid urbanization, toxic traditional cooking methods, and catastrophic out-of-pocket costs for medications. Beyond environmental and economic factors is the examination into how the 2019 coronavirus pandemic altered the focus and availability of health services coupled with an appraisal of the political conflict that has crippled Myanmar's health care system and threatened 50% poverty rates in 2022. These profound factors necessitate multifaceted asthma awareness, prevention, and treatment initiatives. Recommendations include education to increase asthma health literacy and facilitate the transition to modern cooking while monetary supplementation accommodates access to medication and affordable electricity. Additionally, innovative strategies such as price and payment coordination, negotiated truce days, supply air drops, and integrated health services may provide medication, supplies, and asthma treatment in the midst of extreme violence. The role of poverty as a determinant of health cannot be overstated; therefore, the reduction of poverty and development of affordable infrastructure are paramount. Recommendations, though focused on Myanmar, have global implications for countries with a vested interest in meeting sustainable development goals that precipitate the reduction and management of chronic respiratory diseases throughout the world regardless of peace or crisis realities.

Keywords: Myanmar, low to middle income countries, chronic respiratory disease, asthma management, poverty, pollution, pandemics, war, sustainable development goals

According to the World Health Organization (WHO, 2022), chronic noncommunicable diseases that include cardiovascular disease, cancer, and diabetes annually claim over 41 million lives globally; 77% of these deaths occur in low to middle income countries, and 10% are related to respiratory diseases. Asthma, an incurable chronic respiratory disease, is prevalent throughout the world affecting 262 million people (WHO, 2023a). While it can develop at any age, asthma is the leading chronic pediatric disease. Common symptoms include wheezing, coughing, tightness in the chest, and shortness of breath due to inflammation in the lungs or constricting of muscles in the airways. Increasing global prevalence of asthma has been linked to urbanization

and climate change with extreme heat and an increase of pollutants and allergens partly responsible for triggering asthma attacks (WHO, 2017, 2023a).

Although global prevalence of asthma is increasing, global mortality rates are decreasing (Global Initiative for Asthma [GINA], 2023). With proper medical treatment, people are able to manage their symptoms and lead normal lives. When symptoms are poorly managed, asthma can result in difficulty sleeping, feelings of exhaustion, trouble concentrating, and asphyxiation and death in severe cases. Low to middle income countries report higher asthma-related deaths due to poor management precipitated by a lack of access to medical care and medications, nonexistent or minimal health insurance, an inability to pay out-of-pocket expenses, increased exposure to pollutants, and lack of education (WHO, 2022, 2023a). In 2019, approximately 1% of global deaths, or 455,000 deaths, was related to asthma complications (Institute for Health Metrics and Evaluation, 2019; WHO, 2023a). In contrast, that same year 2.63% of deaths in Myanmar were due to asthma, and while that percentage may appear negligible, when compared to other nations the disparity is striking. For example, the asthma mortality rate in the United States is 0.14% making Myanmar's death toll 19 times higher (Institute for Health Metrics and Evaluation, 2019). Such disproportionate asthma outcomes are indicative of the challenges individuals in low to middle income countries face in preventing or managing asthma complications.

The objective of this literature review, focusing on asthma in Myanmar, is to explore chronic respiratory disease prevention, management efforts, and challenges in low to middle income countries. This exploration will consider the socioeconomic and political characteristics unique to Myanmar that exacerbate asthma prevalence and mortality rates. Literature regarding the pollution, poverty, insufficient health care, 2019 coronavirus (COVID-19) pandemic, and violence challenges in Myanmar have been synthesized to examine the leading factors that impede chronic respiratory disease management. By integrating literature that provides practical solutions and utilizing sustainable development goals (United Nations, n.d.) as a springboard for discussion, recommendations focus on increasing health literacy, advocating for monetary supplementation to facilitate access to medication and affordable electricity, and offering strategies for providing aid to countries experiencing pandemic and conflict-related healthcare disruptions.

Determinants of Asthma

Although the exact cause of asthma is unknown, it is linked to respiratory infections and exposure to allergens and pollutants during early childhood that wreak havoc on an immature immune system. In addition, genetics, ethnicity, and obesity can increase susceptibility. Asthma can develop at any age and attacks can be triggered by a variety of factors that include indoor and outdoor allergens and pollutants, physical exertion, air temperature, and humidity. For most, asthma can be managed by identifying and avoiding triggers, establishing a medication regimen (e.g., inhalers, steroids, and immunotherapy), and planning for emergency care in the event of a severe attack (GINA, 2023).

Asthma triggers, specifically pollutants, are particularly widespread in Myanmar partly due to rapid urbanization in the past decade (Aung et al., 2020). For example, from 2013 to 2018, vehicle registration increased by 80%, but this rise in vehicle usage was not paired with a regulatory system, leading to a significant increase in airborne hazardous chemicals from diesel and other toxic fuels (Aung et al., 2020; IQAir, 2020). This rapid increase of consumption and industrialization in turn increases CO_2 output exponentially that has a direct impact on the

incidence and severity of asthma (Aung et al., 2020). While Myanmar air quality is being monitored, air quality standards and regulations remain nonexistent (IQAir, 2020).

In Myanmar, 73% of households are still burning wood, charcoal, or crop byproducts inside their homes to prepare meals especially in locations where electricity is scarce (Koo et al., 2019). Burning such substances indoors for cooking can result in multiple hours of daily exposure to indoor pollutants and at levels 100 times higher than deemed healthy. Not only is asthma attributed to such levels of pollution but exposure also increases the risk for other chronic respiratory diseases (Rumchev et al., 2016). As such, indoor pollutants may pose additional if not greater health risks than those related to urbanization.

Aside from pollutants, there are additional challenges that contribute to the pervasiveness of asthma in Myanmar such as the increased risk of asthma in newborns that are premature or of low birth weight (WHO, 2023a). In Myanmar, 12% of all babies born in 2017 were born earlier than 37 weeks, and 6,000 births were prior to 28 weeks. Additionally, 9% weighed below 5.5lbs, the minimum healthy birth weight (Healthy Newborn Network, 2017). Another challenge is that smoking often leads to detrimental health complications that include exacerbation of asthma as well as the development of cancer, chronic obstructive pulmonary diseases, and cardiovascular disease (GINA, 2023). Myanmar tobacco use is estimated to be twice the global rates with more than 50% of the population partaking in tobacco products and 26% being current smokers (WHO, 2021b). Furthermore, poverty rates were expected to double by 2022 from the combination of the COVID-19 pandemic and political turmoil that has severely impaired the economy (World Bank, 2021). These poverty rates coupled with devastating costs for asthma medication prove detrimental to asthma symptom management (Htet, 2015).

While urbanization, indoor pollutants, and poverty continue to impede asthma management, the COVID-19 global pandemic brought unforeseen challenges that further contributed to inadequate asthma treatment in Myanmar (WHO, 2021b). COVID-19 is an infectious respiratory disease transmitted from person to person through particles released through exhalation such as coughing, sneezing, and speaking. Manifestations of COVID-19 can differ between individuals ranging from no symptoms to severe illness resulting in hospitalization and death (WHO, 2023b). While the current 2023 mutations of this virus currently cause less severe symptoms for most, those with preexisting conditions that include chronic respiratory diseases continue to be at increased risk. As of May 31, 2023, COVID-19 had claimed over 6.9 million lives globally (WHO, 2023b).

Throughout much of the COVID-19 pandemic, many individuals considered high risk for severe complications and death from COVID-19 also faced the psychological stress induced by pandemic concerns that led to depression, insomnia, and posttraumatic stress (Pedrozo-Pupo & Campo-Arias, 2020; WHO, 2021a, 2023b). Fortunately, the WHO (2021a) found those with well-controlled asthma do not face increased risk from COVID-19 although exceptions include those with severe asthma, nonallergic asthma, and both asthma and chronic obstructive pulmonary diseases. Patients using inhaled corticosteroids may garner some protection from COVID-19 whereas utilizing oral corticosteroids may increase risk (GINA, 2022). GINA (2022) concurred that those with well-controlled asthma are not at elevated risk from COVID-19; however, well-controlled asthma can be multifaceted and requires medication adherence and minimal exposure to triggers. Therefore, in countries such as Myanmar, symptom management must take top priority; access to clean air and effectual medications is crucial (GINA, 2023).

In light of mitigation efforts to control the pandemic, countries worldwide shifted focus to COVID-19 treatment, vaccination, and reduction of community spread. As such, these shifts

in public health efforts hindered delivery of other health services across the globe. Additionally, this prompted a shortage of health workers and patient avoidance of physician offices due to fear of contracting COVID-19 (Hacker et al., 2021). While virtual health visits have become common, such physician-patient interaction may not provide sufficient examination. Additionally, technology required for virtual visits may be unavailable to lower income populations, a demographic that is increasing in Myanmar (Hacker et al., 2021). In essence, "the COVID-19 pandemic … exacerbated existing health inequities" and "reduced the ability to prevent or control chronic disease" (Hacker et al., 2021, paras. 3–4).

To further exacerbate the healthcare challenges brought on by the pandemic, Myanmar has been grappling with a military coup since February 2021, which has considerably decreased access to health services and the availability of healthcare workers (WHO, 2021b). Between February 1, 2021, and May 29, 2021, there were 179 military offensives against health care that targeted medical supplies, facilities, transport vehicles, health care personnel, and even patients. Within just 4 months such violence disturbed vital supply lines, crippled trauma response, and resulted in 51 injuries and 13 deaths. "The continuing use of force against health-care workers, including the reported occupation by security forces in hospitals, is taking a devastating toll on Myanmar's health care system" (WHO, 2021b, p. 17).

The double burden of COVID-19 and war has been detrimental to every level of healthcare in Myanmar since February 2021. While COVID-19 restrictions interfered with many chronic disease services, Myanmar has experienced a deterioration of the entirety of its medical infrastructure with patient volumes one 10th of normal rates (WHO, 2021b). COVID-19 restrictions and avoidance of conflict zones kept many people confined to their homes where they were forced to breathe heavily polluted air. The WHO (2021b) noted vector borne diseases, epidemic and pandemic-prone diseases (including COVID-19), reproductive, maternal, and child health, hepatitis, HIV/AIDS, tuberculosis, malnutrition, mental health, and chronic diseases are all at high risk of precipitating excess morbidity and mortality, yet without functioning health reporting and surveillance systems, the effect is currently impossible to quantify.

Healthcare disruptions such as these are not unique to the war in Myanmar. In fact, similar scenes have played out in Iraq, South Sudan, Syria, and Yemen all leading to the breakdown of most basic health services (Raslan et al., 2017). These disruptions not only increased poverty and malnutrition rates but also resulted in uncontrolled chronic and reemerging vaccine-preventable diseases (Raslan et al., 2017). In Syria, for example, wartime experiences also increased environmental factors that trigger asthmatic flare ups and complications. People were forced to stay inside where fumes from cooking with wood or coal or tobacco smoke were elevated, and for those near the warzone, dusts and chemicals from fired weapons and bombings permeated the air (Boulet, 2017). Furthermore, the exposure to violence due to war itself may exacerbate asthma symptoms, increase the need for emergency care, and lessen the effectiveness of certain medications (Apter et al., 2010). As such, wartime has a direct impact on disease prevalence, severity of symptoms, availability of care, and overall quality of life (Boulet, 2017).

Sustainable Development Goals for Prevention

The ability to afford asthma medication and treatment is vital for effective symptom management; however, minimizing exposure to contaminated air may both prevent the development of asthma and circumvent asthma attacks. With this in mind, most effectual asthma prevention efforts in Myanmar need to address underlying infrastructure and economic

deficiencies that contribute to the pervasiveness of asthma. The United Nations' (n.d.) sustainable development goals (SDGs) lay the groundwork for addressing these key factors, setting the stage for long-term solutions.

The reduction of pollution may lessen the burden of asthma and may also reduce the incidence of other significant diseases, including emphysema, pneumonia, lung cancer, liver and kidney damage, and heart disease (IQAir, 2020). Unfortunately, with more than 13% of Myanmar homes without access to any source of electricity and another 13% of households with access less than 4 hours a day, the ability to reduce in-home pollution through modern cooking is out of reach (Koo et al., 2019). As such, expanding the power grid to rural communities and making it financially feasible can lead to toxic-free meal preparation thereby reducing health complications from indoor pollution (Rumchev et al., 2016). SDG 7 seeks to "ensure access to affordable, reliable, sustainable and modern energy for all" (United Nations, n.d., Goal 7 section). Aligning asthma prevention and management efforts with this goal could provide millions of homes all over the world with access to affordable electricity and clean energy that in turn may reduce dependency on toxic fuel sources for cooking.

In addition to accessible energy, strides must be made to eliminate poverty that can lessen the burden of chronic disease worldwide (WHO, 2022). Poverty can be linked to nearly every chronic disease due to finite resources, exposure to pollutants, unclean water, lack of sufficient nutrition, and inability to access health care; therefore, ending poverty is vital for the global prevention and treatment of chronic disease (WHO, 2022). As such, efforts should align with SDG 1, aiming to "end poverty in all its forms everywhere" (United Nations, n.d., Goal 1 section). In Myanmar, it was estimated that nearly 50% of the population would face poverty by 2022 due to the interplay of political conflict and the COVID-19 pandemic (World Bank, 2021). Prior to this time, affordability of asthma medications already proved a significant challenge with exorbitant medication costs contributing to poverty rates, the selling of property, or simply going without live-saving treatment (Htet, 2015).

Recommendations

The need for concerted efforts to control chronic disease morbidity and mortality is a primary concern for Myanmar. In 2017, in partnership with the WHO, Myanmar's government released the national strategic plan for prevention and control of noncommunicable diseases. This strategy was specifically created to reduce the risk factors for developing various chronic diseases; however, efforts were stalled due to military takeover (WHO, 2021b). Consequently, resources from reputable long standing initiatives, such as GINA, are needed in already resource-poor settings.

The goal of GINA is to reduce global asthma prevalence, morbidity and mortality through collaboration with global health care and public health professionals who provide guidelines on the diagnosis, prevention, treatment, and best practices for asthma at every life stage with updates that encompass a COVID-19 response. GINA's science committee evaluates asthma research and annually revises reports to ensure up-to-date scientific information is available that also provides cost-effective approaches for those with limited resources (GINA, 2023).Therefore, the dissemination of GINA documents among the general population can be impactful at guiding multifaceted interventions that increase knowledge and awareness of asthma prevalence and management. These resources can increase health literacy so patients and family members are able to recognize symptoms, reduce environmental triggers, and understand correct

inhaler usage (GINA, 2023). An optimal and low-cost method of information delivery is through texting campaigns for those with access to cellular technology (Chen et al., 2018).

While educating patients and family members is integral for home prevention efforts, it is also important to distribute information to all healthcare providers. Asthma specialists may be unaffordable, and in times of war and pandemic disruption, accessibility may be limited due to closures or an inability to leave the home. Therefore, equipping general practitioners, pharmacists, and nurses with GINA documentation can ensure asthma management guidance is more readily available to correctly diagnose and counsel for optimal symptom control (GINA, 2023) Furthermore, many low income countries heavily depend on volunteer community health workers as a primary means of providing care; thus, this vital community resource must be included in GINA document distribution (Semo & Frissa, 2020).

In addition to medication guidance, GINA prescribes nonpharmacological interventions for asthma symptom management such as air pollution control (GINA, 2023). Understanding the connection between pollution and asthma is essential; however, a more direct approach may persuade the 36% of Myanmar's population who do not use an electric stove despite having access to electricity (Koo et al., 2019). One strategy is to provide cooking with electricity classes to increase familiarity and confidence via a "less technical, more culture-specific and personalized approach" (Vigolo et al., 2018, Implications for Policy Makers section). Additionally, instruction must be geared towards women who traditionally prepare meals as addressing their challenges may ensure long-term adoption of modern cooking (Vigolo et al., 2018). By working with communities and providing innovative strategies to support the transition to cooking with electricity, adaptation is possible thereby leading to a reduction of air pollution triggers.

With the potential for poverty rates in Myanmar to have reached 50% in 2022, families may find the transition to modern cooking cost prohibitive. Though 12% of those without electricity live near a power grid, high costs related to connecting and maintaining grid connection are access barriers that impede progress towards lessening indoor air pollution (Koo et al., 2019). For those unable to afford this transition, incentives and facilitated access to credit is useful; however, such financial assistance must be paired with education and awareness programs for long-term sustainability (Vigolo et al., 2018). By monetarily supplementing access and use of the power grid, the prospective decrease in toxic cooking may lessen the severity and frequency of asthma attacks that may reduce the cost burden of asthma treatment.

In addition to incentives that increase access to electricity, other financial interventions may be advantageous for asthma treatment. Unaffordable medications lead to unmanaged asthma symptoms especially in developing countries, and well-controlled asthma is integral for avoiding severe complications that include those related to COVID-19 (GINA, 2022, 2023). Individuals who cannot afford medications may use them sparingly or simply go without, yet these desperate decisions can have fatal outcomes. For those in extreme poverty, medication rebates and cost-sharing interventions may increase affordability and adherence (Bilger et al., 2019; Garrido & Frakt, 2018). Addressing poverty-related factors to indoor air pollution and medication nonadherence are integral for the prevention and treatment of many chronic diseases and vital for minimizing risk of severe symptoms and death.

The aforementioned recommendations offer approaches for education and resource accessibility, yet additional strategies are warranted for reaching those most in need while Myanmar is immobilized by war. For example, the Yemen Relief and Reconstruction Foundation was able to remotely supply medication to the poorest families in a warring Yemen by

completing price comparisons, negotiating for favorable pricing, and sending medication funds ahead of patient pick up (Kimball & Jumaan, 2020). While negotiated truce days may provide peaceful means of supplying asthma medication directly to patients, supply air drops may be required in areas of extreme conflict, which is also a favorable strategy for distributing the aforementioned GINA materials (Levine, 2007, p. 130; Meininghaus, 2016).

While some approaches provide aid remotely, medical care remains a concern as it often requires in-person interaction; therefore, consideration should be given to integrating health care in nonmedical places where people might congregate such as schools, charities, and religious settings. For example, additional health services might be integrated alongside vaccination campaigns, offering an opportunity to provide patients with education and treatment for asthma and other chronic diseases (WHO, 2021b).

In times of conflict, humanitarian efforts can be effective at delivering resources and reaching patients to insure continued asthma treatment. Some conflicts, especially those with global exposure, garner foreign aid although such support is often limited thus requiring the consideration of long-term solutions. Efforts made to invest a portion of resources into economic development may yield numerous benefits to public health efforts in the future (Raslan et al., 2017; WHO, 2021b). For example, in reviewing the impact of war on healthcare in the Eastern Mediterranean, Raslan et al. (2017) called on measures that prove beneficial to future generations such as building sustainable infrastructure.

Implications for Practice

The persistent and evident effects of COVID-19 and conflict in countries around the world contribute to the global increase in chronic disease prevalence. In Myanmar, civil war threatens the population's most basic needs, which underscores the detrimental impact pandemics and war can have on individual health and health care systems. Beyond Myanmar, the provided recommendations have global implications for the numerous nations with a vested interest in meeting sustainable development goals that work to reduce and manage chronic respiratory diseases, such as asthma, regardless of peace or crisis realities. Efforts made to decrease pollution, increase access to cost-effective electricity, expand sustainable infrastructure, and minimize medication costs will help decrease poverty, increase affordable and clean energy, and ultimately reduce the burden of chronic diseases throughout the world.

Conclusion

Chronic diseases claim 41 million lives every year with the majority of deaths occurring in low to middle income countries. Asthma is a chronic respiratory disease whose prevalence is increasing throughout the world, and while global death rates are declining, for countries such as Myanmar asthma mortality is worthy of concern. This article explored the socioeconomic and political factors that directly and indirectly have led to high asthma mortality rates in Myanmar. While increased urbanization and indoor pollution are exacerbating factors, the effects of poverty have far reaching implications that significantly contribute to the disparity of health outcomes. Furthermore, the double burden of COVID-19 and current political violence have had detrimental impacts to Myanmar's healthcare system leading to a reversal of efforts made towards prevention and management of all noncommunicable diseases. Recommendations geared towards providing lost-cost health education and medications, decreasing worldwide

pollution, and investing in clean, affordable, and sustainable infrastructure will lessen the burden of asthma in Myanmar and can be adapted to reduce the global prevalence of chronic disease.

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