ambee

Enhancing Patient Care By Integrating Air Quality Data Into Digital Health Systems

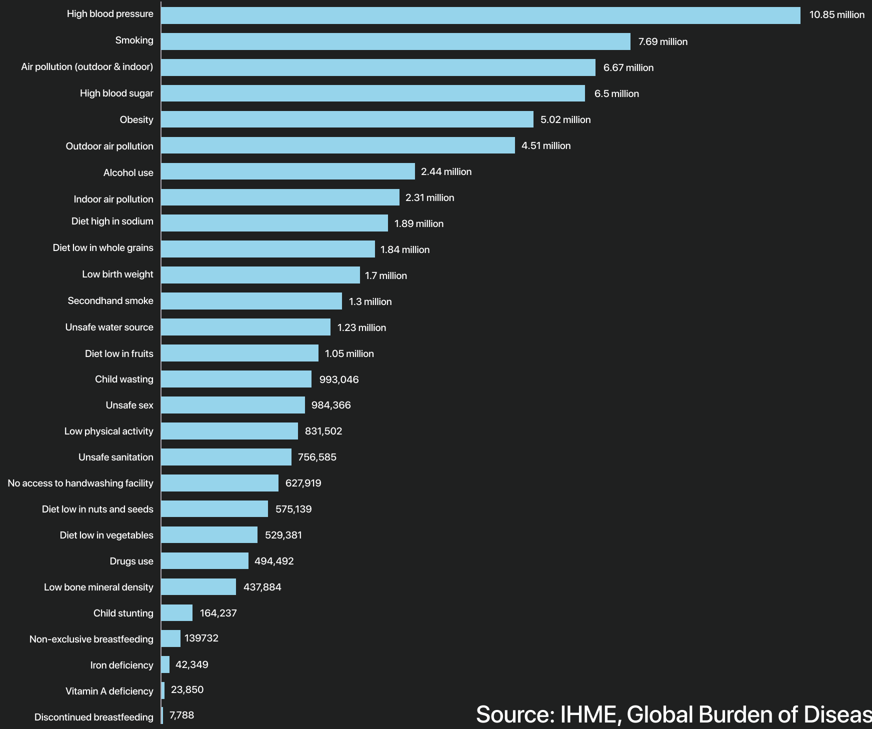
The state of the air we breathe

Air pollution is one of the biggest risk factors globally, with 7 million premature deaths occurring each year. It is the fourth leading cause of death globally. 9 out of 10 people worldwide are exposed to levels of air pollutants that exceed the World Health Organization's safe levels.

In the visualization, we see the number of deaths per year attributed to each risk factor. Air pollution is one of the leading risk factors.

Number of deaths by risk factor, World, 2019

Total annual number of deaths by risk factor, measured across all age groups and both sexes.



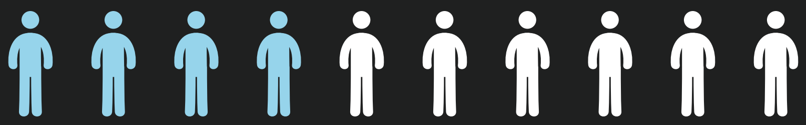
Source: IHME, Global Burden of Disease(2019)

Air pollution—outdoor and indoor—comes from many sources, the majority of them due to human activities such as:

- Burning of fossil fuels to generate electricity for homes and businesses or petrol and diesel to power our transportation
- Industrial processes, particularly from the chemical and mining industries
- Agriculture, which is a major source of methane and ammonia
- Waste treatment and management, particularly landfills
- Indoor cooking and heating systems
- Volcanic eruptions, dust storms, and other natural processes

These sources spew out substances like carbon monoxide, carbon dioxide, nitrogen dioxide, nitrogen oxide, ground-level ozone, particulate matter (PM), sulfur dioxide, hydrocarbons, and lead—all harmful to human health. Deaths and illnesses from air pollution are largely down to tiny, invisible airborne particles known as particulate matter. The smallest particles are the deadliest: PM2.5 particles, which are 2.5 microns or less in diameter, and PM10, which are 10 microns or less in diameter. These bypass your body's defenses and lodge in your lungs, bloodstream, and brain.

Recent findings in the 2021 State of the Air Report show how climate change–fueled wildfires and extreme heat are adding to the challenges.



More than 4 in 10 Americans live in places with unhealthy levels of air pollution

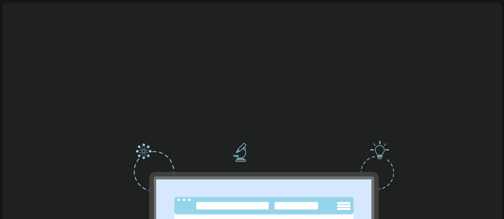
Source: 2021 State of the Air Report

Exposure to air pollution increases the likelihood of developing cardiovascular diseases, including heart disease, strokes, and high blood pressure. It also weakens the immune system, rendering individuals more vulnerable to lower respiratory infections such as pneumonia and bronchitis. Air pollution serves as a significant risk factor for chronic obstructive pulmonary disease (COPD), precipitating chronic bronchitis and emphysema through the inflammation and destruction of airways and lung tissue.

Given these health implications, addressing air pollution through comprehensive measures becomes imperative for healthcare companies. They can achieve this by integrating air quality (AQ) data into their digital healthcare systems. Let’s dive deeper into this.

Integration of air quality data into digital health systems

Accurate and actionable air quality data can help companies improve their healthcare systems if used correctly. Digital healthcare companies can leverage air quality data to improve their services and enhance patient outcomes. Here are a few examples.



Chronic asthma management

As we know, air pollution can worsen or trigger asthma symptoms. People suffering from moderate to severe asthma are 40% more likely to have acute asthma episodes on high-pollution days than on days

with average pollution levels.

Asthma patients can benefit from real-time air quality information to better manage their condition. Through the integration of air quality data on mobile apps or devices, digital healthcare companies can track the air quality levels in their patient's surroundings and alert them in case of any abnormalities. This added information to health data can help provide personalized asthma management plans, alerts, and recommendations to minimize exposure to polluted air. This way, healthcare professionals can empower patients to track the air quality levels and stay clear of any potential triggers.

US EPA provides air quality index (AQI) levels and recommendations that can be used by both healthcare professionals and patients to assess the dangers of poor air quality. Take a look at it below:

AQI Category	Index Values	What it means
Good	0 - 50	Air quality is good and poses little or no risk.
Moderate	51 - 100	Air quality is acceptable; however, there may be some health concerns for a small number of unusually sensitive people.
Unhealthy for Sensitive Groups	101 - 150	When air quality is in the range, people who are in sensitive groups may experience health effects when engaged in outdoor activities.

Unhealthy	151 - 200	When air quality is in the range, everyone who is active outdoors may experience effects. Members of sensitive groups are likely to experience more serious effects.
Unhealthy	201 - 300	When air quality is in the range, it is expected that there will be widespread effects among the general population and more serious effects in members of sensitive groups.
Hazardous	301 - 400	Air quality in this range triggers health warnings of emergency conditions by media outlets. The entire population is more likely to be affected by serious health effects.
	401 - 500	

Personalized healthcare

Exposure to poor air quality impacts people in different ways. A one-size-fits-all solution is often inadequate when it comes to helping patients combat the ailments brought by air pollution. Personalized healthcare involves the regular monitoring of symptoms but with a deeper consideration of the patient's environment, genes, and lifestyle to formulate unique treatment plans and risk prevention strategies.

Extensive data and insights on air quality can give healthcare companies the necessary boost to understand patients and their unique conditions better. By integrating air quality data into their platforms, digital healthcare companies can provide personalized health recommendations to individuals based on their local air quality. AQ data can help identify the specific triggering factors in individual patients, enabling healthcare providers to tailor treatment plans to their needs.

To provide an example, a health app can notify users about high pollution levels in their area and advise them to limit outdoor activities or take precautions to protect their respiratory health. By combining past health records with ambient air quality data, these notifications and alerts can be highly personalized to help patients live healthier lives. A personalized approach creates space for greater consumer satisfaction, higher healthcare value, and eventually increased ROI.

Exhibit 1: Personalized Health Care Provides Three Main Types of Value

Greater consumer satisfaction	**Higher health care value**	**Added Revenue**
Targeted interactions to improve the experience	Improved quality of care with lower costs	Revenue growth
Care from in-network providers	An annual wellness visit	Patient or member acquisition
Hassle-free appointment scheduling	Consistent medication adherence	Patient or member retention to improve customer lifetime value
Ways to save on prescriptions	Preventive screenings	Better Medicare star ratings

Improved care for mental health

Air quality has always been recognized as a significant environmental factor that can impact various aspects of human health. While the physical health implications of poor air quality are well-established, emerging research suggests that air pollution may also have implications for mental health.

The American Psychological Association states that high levels of air pollution may damage children's cognitive abilities, increase the risk of cognitive decline among adults, and contribute to depression. A 2019 study confirmed that people exposed to high levels of air pollution are much more likely to suffer from a psychiatric illnesses such as depression, schizophrenia, bipolar disorder, or personality disorder.

Ambee's client, juli, a digital health app provider, recently published a study showcasing the link between air pollution and bipolar disorder. They found that as air quality worsened, symptoms of depression increased among those who suffered from bipolar disorder.

These instances showcase the importance of air quality data in managing and mitigating these impacts. With air quality data, digital healthcare companies working with patients with mental health problems can identify potential triggers for their patient's symptoms and find suitable solutions. While research on these issues is a priority for healthcare companies, AQ data can also be used to increase public awareness about the impact of pollution on mental health.

Targeted advertisements

More than 80% of consumers are more likely to make a purchase when if brands provide personalized messaging or experiences exclusively crafted to their choices. A report by Salesforce states that 97% of marketers witnessed a rise in business outcomes as a result of personalization.

Healthcare companies have now started to embrace data-driven strategies to personalize their advertisements and engage with their target audience. One such aspect is the use of air quality data to enhance targeted advertisements. By leveraging air quality information, digital healthcare businesses can promote products and services that cater to specific air pollution-related health needs.

By analyzing air quality data, digital healthcare businesses can identify geographic regions with higher pollution levels. This information enables them to tailor their products and services to meet the specific needs of individuals living in those areas. For example, they may promote air purifiers, respiratory masks, or specialized healthcare services targeting respiratory illnesses in polluted regions. Such targeted advertisements ensure that consumers receive relevant and valuable solutions for their health concerns.

Through targeted advertisements, they can also educate the public about the detrimental effects of air pollution on respiratory health, cardiovascular well-being, and overall quality of life and provide recommendations to stay ahead. These recommendations can be highly personalized, taking the local air quality levels into account.

New innovative solutions

With digital healthcare companies at the forefront of technological advancements, improving healthcare outcomes by integrating air quality data into their platforms have opened up new avenues. These companies harness air quality data to revolutionize the digital healthcare landscape. Some of the groundbreaking technologies that have and could continue to help improve patient care are:

- **Wearable devices:** Digital healthcare companies are incorporating air quality sensors into wearable devices to provide real-time monitoring of air pollution levels. These intelligent devices not only assist people in pursuing a healthier lifestyle but also provide a constant stream of healthcare data for disease diagnosis and treatment. By combining AQ data with personal health data, such as heart rate and respiratory rate, these devices can offer personalized insights and alerts to individuals about potential health risks associated with poor air quality.

- **Mobile applications:** Many mobile applications developed by digital healthcare companies leverage air quality data to help individuals track and manage their exposure to polluted environments. These apps provide users with up-to-date air quality information specific to their location, along with personalized recommendations on protective measures. Users can receive notifications when air quality reaches dangerous levels, allowing them to take necessary precautions to safeguard their health.

- **Predictive analytics for respiratory health:** Digital healthcare companies utilize advanced analytics and machine learning algorithms to predict the impact of air quality on respiratory health. By analyzing historical air quality data, weather patterns, and health records, these companies can generate personalized risk assessments for individuals susceptible to respiratory conditions. This enables proactive interventions, such as medication adjustments, lifestyle modifications, and targeted preventive measures, to mitigate the adverse effects of air pollution on respiratory health.

- **Remote patient monitoring:** Air quality data is increasingly being integrated into remote patient monitoring systems. This integration allows healthcare providers to remotely assess patients' health conditions, taking into account the air quality of their surroundings. This helps, especially at times when people think twice before stepping out; innovating digital solutions to serve patients remotely can become a key differentiator.

Actionable air quality data at your service

Ambee’s air quality APIs provide hyperlocal air quality with a detailed overview of parameters such as PM2.5, PM10, AQI, and more. These APIs provide historical, real-time, and forecast data. This data is available across more than 100 countries with a spatial resolution of 5 sq km and the capability to go down further.

At Ambee, we combine the power of on-ground sensors, satellite imagery, and other station data sources. We process this data through our artificial neural networks and advanced data analytics to provide accurate air quality data at a zip-code level. Here’s the list of parameters we provide.

PM2.5	Particulate matter < 2.5um (ug/m3)
PM10	Particulate matter < 10um (ug/m3)
SO2	Sulphur dioxide conc (ppb)
NO2	Nitrogen dioxide conc (ppb)
OZONE	OZONE conc (ppb)
CO	Carbon monoxide conc (ppm)
AQI	Air quality index
updatedAT	ISO timestamp of event in UTC

Ambee's air quality data enables anyone, anywhere in the world, to understand their hyperlocal environment in real time. The datasets provided by Ambee are used to power decisions across continents, from startups to Fortune 500 companies. Using the air quality data, companies can create valuable campaigns and solutions that help their customers avoid pollution-related issues and tackle them all together.

For further details on AQ API and its response parameters, please visit our API documentation page.

Clients utilizing Ambee's AQ data for their digital healthcare needs

Wellthy

Due to the rising risks of AQ-related health issues, Wellthy Therapeutics aimed to achieve better diagnoses and create personalized treatment plans for their customers. In collaboration with Ambee, they provide detailed information on a patient's exposure to hazardous pollutants directly to the patient or even to the patient's physician if authorized. This helps the customers better understand the air around them to minimize the effects.

Here are the details of this partnership.

juli

To help minimize the effects of air pollution on physical and mental health, juli, a digital health company, turned to air quality data by Ambee. They added Ambee's air quality to their digital health platform to help customers better identify how this factor impacts their health and help them manage their conditions with data-backed decisions.

This partnership also initiated a massive app retention rate (26%) and customer engagement (2.2 times per week on average) for juli while simultaneously making lives easier for their customers. Read more.

Sonohaler

Ambee also partnered with Sonohaler, a digital healthcare company, to provide real-time air quality for their smart asthma devices. This helps their customers stay alert about their environment's pollution levels and help them live healthier lives.

The future of digital healthcare

Digital healthcare companies must continue to innovate by harnessing the power of air quality data. These innovations have the potential to improve respiratory health outcomes, raise awareness, and pave the way for a healthier future where individuals can make informed decisions to protect their well-being in polluted environments.

With AQ data integrated into different healthcare platforms, patients can take preventative measures to reduce their exposure to pollution. Forecast AQ data can also enable predictive analytics to anticipate future pollution levels. By analyzing historical pollution data and other environmental factors, predictive analytics could help healthcare providers develop early warning systems and improve patient treatment plans. The added potential of AI and machine learning can also revolutionize how we manage healthcare.

At Ambee, our mission is to propel the advancement of healthcare systems through our comprehensive datasets. By providing accurate data and valuable insights, we empower the digital healthcare industry to develop innovative products and enhance services. Our goal is to assist patients in effectively managing their conditions while also mitigating future risks.

To learn more about the role of air quality data in digital healthcare, Get in touch.