

Mitigating the impact of air pollution on health: The role of community pharmacists

Global survey report

2020



Colophon

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Executive summary

In 2019, the World Health Organization (WHO) listed air pollution and climate change as one of the top 10 threats to global health. According to the WHO, air pollution is the greatest environmental risk to health, with nine out of 10 people breathing polluted air every day.

There is an urgent need for air pollution not only to be urgently addressed for its devastating effects on the environment and global warming, but also for the direct threat it poses to the health of individuals and communities. It is imperative that health systems and healthcare professionals work in synergy to mitigate the impact of air pollution on people's health and quality of life. In particular, there is an emerging role for community pharmacists in the fight against the deleterious effects of air pollution, not only in responding to and managing respiratory illnesses and symptoms, but also in supporting proactive individual and community respiratory wellness.

Between May and June 2020, FIP conducted the first-ever survey on "Air pollution and respiratory health: Awareness and roles of community pharmacists". Responses were received from 62 countries and territories.

FIP conducted this survey with the aims of better understanding pharmacists' awareness of the impact of air pollution on respiratory health, their current role in respiratory care, and what are the main barriers and drivers for them to fully realise this role, such as gaps in knowledge, tools and other resources, including the availability of guidelines. The data and intelligence emerging from this survey may inform policymaking, advocacy efforts and new service development by pharmacist organisations around the world.

KEY FINDINGS

Pharmacists' awareness of the impact of air pollution on respiratory health

- 76% of respondents consider that pharmacists have some level of knowledge regarding the short- and long-term impacts of air pollution on respiratory health, but data point to the need to expand the competence of pharmacists in this area across all regions.
- Industrial and outdoor pollutants, followed by household pollutants and pollens, represent the major triggers that result in patient consultations with their community pharmacists.
- In 70% of responding countries and territories, pharmacists do not have an optimal understanding of the protective role of the nose against external aggressors and pollutants.
- 50% of respondents were not entirely aware of the link between air pollution and immune response to viral infections (including colds, flu or COVID-19).

The current role of community pharmacists in respiratory care

- The most commonly reported roles include support to self-care including the use of non-prescription medicines (84% of respondents), and the promotion of adherence to medication (also 84% of the sample). These roles are an integral part of pharmacists' responsibilities as first-line medicines experts.
- Only 5% of respondents considered that pharmacists in their country generally and proactively discuss and manage the impacts of air pollution on respiratory health with patients or the public.
- The common cold ranked first as the most commonly consulted condition, followed by allergens, influenza, asthma, COVID-19, COPD and other respiratory viruses.
- Advice on protection from pollens was reported as the most common type of preventive counselling offered by pharmacists. Advice on protection from both indoor and outdoor (industrial or produced by vehicles) pollutants is provided by pharmacists in less than half of respondent countries and territories, with over one fifth of respondents indicating that pharmacists do not yet provide any type of advice in this area.
- Nasal sprays are the most common non-pharmacological measure recommended by community pharmacists in 82% of countries and territories, with nasal washes being the second most recommended measure (73%). Both are important measures to promote nasal hygiene and preserve the protective function of the nose.

- Community pharmacies are significantly underutilised in the screening of respiratory disorders in 95% of responding countries and territories.

Drivers and barriers to maximising pharmacists' role in respiratory care

- The most commonly reported barrier (for 64% of respondents) to undertaking a proactive role in respiratory health was the perceived lack of knowledge and need for increased training.
- The second most important barrier (for 47% of respondents) was the lack of an appropriate remuneration model.
- In 17% of responding countries and territories, pharmacists are not legally authorised to perform screening and triage of patients.
- In terms of the availability of practice guidelines and standards, asthma has the highest number of such resources (24 countries). No guidelines for the common cold, influenza, COPD, COVID-19, or allergies are available in more than 50% of countries. This points to the absolute need for professional organisations, including FIP, to develop such guidance to support this much-needed transformation of community pharmacy practice.
- The top three most desired changes are to have more tools and devices to support their role in patient screening and triage (77%) and to have increased competence to identify and differentiate respiratory conditions (73%) and to advise patients on the impact of air pollution on their health (72%).
- The most commonly referred changes expected after the pandemic are related to:
 1. Increased recognition of the role of pharmacists in primary health care and in respiratory care in particular;
 2. Expanded authority and scope of practice to manage respiratory conditions in the community;
 3. Expanded authority to vaccinate, to prevent several respiratory diseases;
 4. More use of technology for remote consultations and patient care;
 5. More tools to support pharmacists in identifying and screening respiratory diseases, including more point-of-care tests; and
 6. Tools and protocols for distinguishing COVID-19 from other respiratory diseases, like the flu.
- Only 5% of respondents consider they have the appropriate incentives to perform these roles, such as appropriate remuneration models, continued professional development opportunities and adequate recognition of this role.
- The most demanded practice-support tools are related to access to information to adequately advise patients, including local and real-time risk for health from air pollution, and information from patients themselves, collected via a standard questionnaire and a shared patient record.
- The most valued point-of-care testing tools were smart peak flow meters (56% of respondents) and rapid blood test strips to identify patient's risk or susceptibility to oxidative stress damage (46%).
- Other screening tools included rapid swab tests for markers of nasal inflammation following pollution exposure, and nasal pH tests for pollution exposure.
- 92% of respondents agreed with the statement that pharmacists want to evolve their role as trusted advisors and provide value to patients through education and proactive care in the area of respiratory care and air pollution.

In summary, appropriate conditions need to be met for these roles to be fully integrated in pharmacy practice:

- More education and training both at undergraduate and CPD levels are needed to develop the necessary competence;
- Adequate remuneration models should underpin the sustainability of these services and provide the incentives to adopt them broadly into mainstream practice;
- More public awareness of this health threat as well as these new roles of pharmacists is needed;
- Appropriate guidelines, regulatory support and screening tools are essential to support these roles; and
- Better interprofessional collaboration, supported by shared electronic patient records, would lead to better patient care outcomes.

Acknowledgments and funding

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1 Introduction — Impact of air pollution on human respiratory health

In 2019, the World Health Organization (WHO) listed air pollution and climate change as one of the top 10 threats to global health. (1) According to the WHO, air pollution is the greatest environmental risk to health, with nine out of 10 people breathing polluted air every day. In 2014, 92% of the world population was living in places where the WHO air quality guidelines levels were not met. (2) Air pollution contributes to over seven million premature deaths per annum from diseases such as cancer, stroke, heart and lung disease. Around 90% of these deaths are in low- and middle-income countries, with high volumes of emissions from industry, transport and agriculture, as well as dirty cookstoves and fuels in homes. (3)

The primary cause of air pollution (burning fossil fuels) is also a major contributor to climate change, which impacts people's health in different ways. Between 2030 and 2050, climate change is expected to cause 250,000 additional deaths per year, from malnutrition, malaria, diarrhoea and heat stress. (4)

Air pollution increases the risk of respiratory diseases, such as asthma, respiratory infections and chronic obstructive pulmonary disease (COPD) in both children and adults. Among the many pollutants that greatly affect health, particulate matter (particles of variable but very small diameter) penetrates the respiratory system via inhalation, causing respiratory and cardiovascular diseases, reproductive and central nervous system dysfunctions, and cancer. (5)

Despite the fact that ozone in the stratosphere plays a protective role against ultraviolet irradiation, it is harmful when in high concentration at ground level, also affecting the respiratory and cardiovascular system. Furthermore, nitrogen oxide, sulphur dioxide, volatile organic compounds, dioxins and polycyclic aromatic hydrocarbons are all considered air pollutants that are harmful to humans. Carbon monoxide can even provoke direct poisoning when inhaled at high levels. (5)

Diseases occurring from the aforementioned substances include principally respiratory problems such as COPD, asthma and bronchiolitis, as well as lung cancer, cardiovascular events, central nervous system dysfunctions and cutaneous diseases. (5)

Air pollution also makes individuals more vulnerable to infectious respiratory diseases and to the effects of outbreaks and pandemics, including the more severe forms of these conditions, due to its effect on immune response. Evidence suggests that exposure to air pollutants is not only associated with the dysregulation of immune tolerance but also with the dysregulation of antimicrobial and antiviral immunity. (6) Also, recent evidence supports a clear association between air concentrations of some pollutants and human respiratory viruses interacting to adversely affect the respiratory system, with most results indicating that chronic exposure to air pollutants delays and/or complicates recovery of patients from COVID-19 and leads to more severe and lethal forms of this disease. (7)

Air pollutants are either derived from human activities (such as industrial emissions, residential heating, construction, agricultural activities, war and fire accidents), from natural hazards (such as earthquakes, spontaneous forest fires and extreme temperature) and from indoor air pollutants released from smoking, building materials, air conditioning, house cleaning or air refreshing products, heating, lighting, and wood, fuel, or coal usage in cooking.

With regard to indoor air pollution, according the WHO, around three billion people cook and heat their homes using open fires and simple stoves burning biomass (wood, animal dung and crop waste) and coal. Over four million people die prematurely from illness attributable to household air pollution from cooking with solid fuels and more than 50% of premature deaths from pneumonia among children under 5 are caused by the particulate matter (soot) inhaled from household air pollution. In addition, 3.8 million premature deaths annually from non-communicable diseases, including stroke, ischaemic heart disease, COPD and lung cancer, are attributed to exposure to household air pollution. (2)

Air pollution needs to be addressed urgently and not only as an environmental and ecological threat, but also as a direct threat to health. Health systems and healthcare professionals play a pivotal role in addressing and mitigating the impact of air pollution on people's health and quality of life through a multidisciplinary approach and new roles and professional services.

Community pharmacists are taking on an evolving role in the management of respiratory illness by providing comprehensive education and patient-centred care. However, there is potential for pharmacists' increased involvement to tackle air pollution and its repercussions on the health of patients in their communities.

2 About the study

2.1 Aim and objectives

FIP conducted this survey with the aims of better understanding the current role of community pharmacists in respiratory care, investigating the availability of national guidelines and protocols for pharmacists to manage the impacts of air pollution on respiratory health, and identify any potential gaps in knowledge, tools and other resources, as well as the barriers to realising their role in patient education, screening and treatment.

FIP therefore collaborated with member organisations and other pharmacist organisations to conduct a global survey-based study to obtain baseline data on these topics that can be used to assess progress over time, and also to raise the awareness of these organisations about the importance of this health threat and such emerging roles for pharmacists. This report will thus point to the existing needs in terms of guidance, tools and recommendations to support this role by pharmacists. The data and intelligence emerging from this survey may inform policymaking, advocacy efforts and new service development by pharmacist organisations around the world.

This study is divided into three main sections with the following objectives:

Part 1: Pharmacists' awareness of the impact of air pollution on respiratory health (Chapter 3)

- To understand community pharmacists' current awareness, knowledge and perceptions about the impact of air pollution on respiratory health;
- To explore the knowledge that community pharmacists have around nasal health; and
- To assess pharmacists' understanding of the link between air pollution and immune response.

Part 2: The current role of community pharmacists in respiratory care (Chapter 4)

- To explore the relevance and importance of air pollution in the daily practice of community pharmacists;
- To determine the current role of community pharmacists in respiratory illness and respiratory wellness;
- To understand community pharmacists' current recommendations in terms of nasal hygiene practices that may help defend against the health impacts of air pollution exposure, as well as treatment options for nasal health, cold and flu, and allergy; and
- To understand the current patient respiratory wellness pathway in the community, including community pharmacy.

Part 3: Drivers and barriers to maximising pharmacists' role in respiratory care (Chapter 5)

- To identify gaps in knowledge among community pharmacists on the impact of air pollution on respiratory care;
- To assess the availability of guidelines/protocols/materials to facilitate patient screening/decision making/education/counselling/recommendations for respiratory care/wellness;
- To identify gaps in tools and other resources; and
- To identify the motivations and barriers of community pharmacists to fulfil a role in proactively educating and supporting the respiratory wellness of patients.

2.2 Data collection methodology, tools and glossary

This study was based on data collected from FIP member organisations and other partner organisations through the "Air pollution and respiratory health: Awareness and roles of community pharmacists" survey, conducted between May and June 2020.

Design of the survey questionnaire

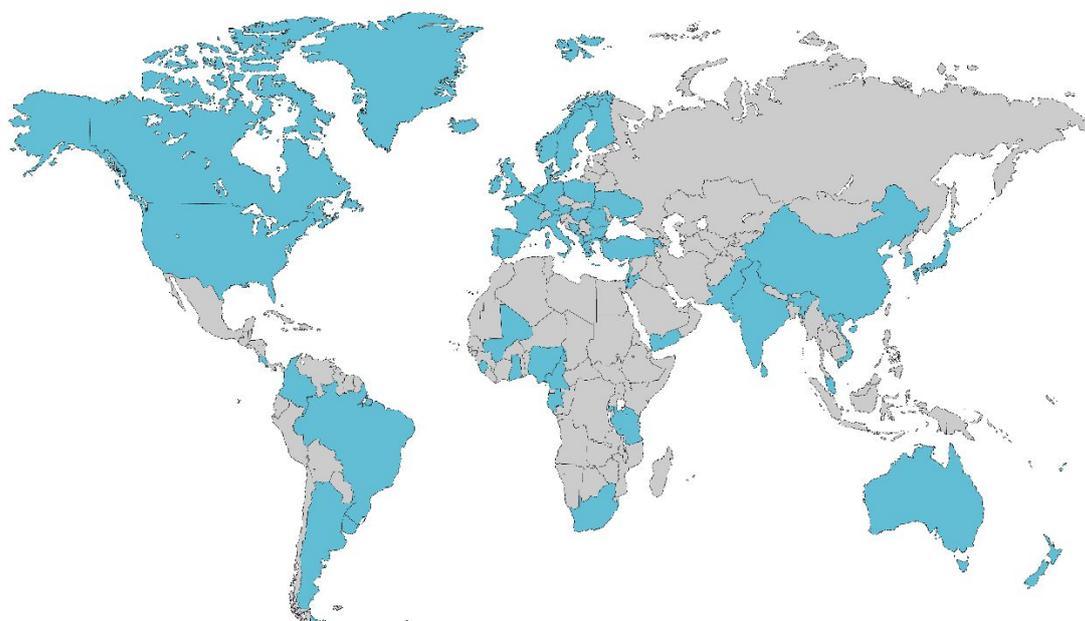
Developed by FIP, this survey was conducted primarily using the online survey platform Question Pro. The questionnaires were also distributed when requested as PDF forms to facilitate data collection.

The survey was conducted in five languages (Arabic, English, French, Russian and Spanish). The questionnaire is included as [Appendix 1](#).

2.3 Study sample and demographics

A total of 123 professional organisations from 113 countries and territories were invited to participate in this study. Responses were received from 62 countries and territories (55%), which includes responses from 56 FIP member organisations, one observer organisation and five non-member organisations. All participating organisations are listed in the Section “Special thanks” (see page 27), and Figure 1 presents a geographical overview of the participating countries and territories. Table 1 shows the breakdown of the regional distribution of respondents.

Figure 1. Countries and territories that participated in the study (n=62)



■ Countries and territories that participated in the study

Table 1. Sample distribution per WHO region

Region	Countries and territories invited to participate (n)	Responses (n)	Response rate per region (%)	Percentage of the sample (%)
Africa (AFR)	27	10	37%	16%
Eastern Mediterranean (EMR)	13	4	31%	6%
Europe (EUR)	48	29	60%	47%
The Americas (PAR)	15	7	47%	11%
Southeast Asia (SEAR)	6	2	33%	3%
Western Pacific (WPR)	14	10	71%	16%
Total	123	62	50%	100%

3 Pharmacists' awareness of the impact of air pollution on respiratory health

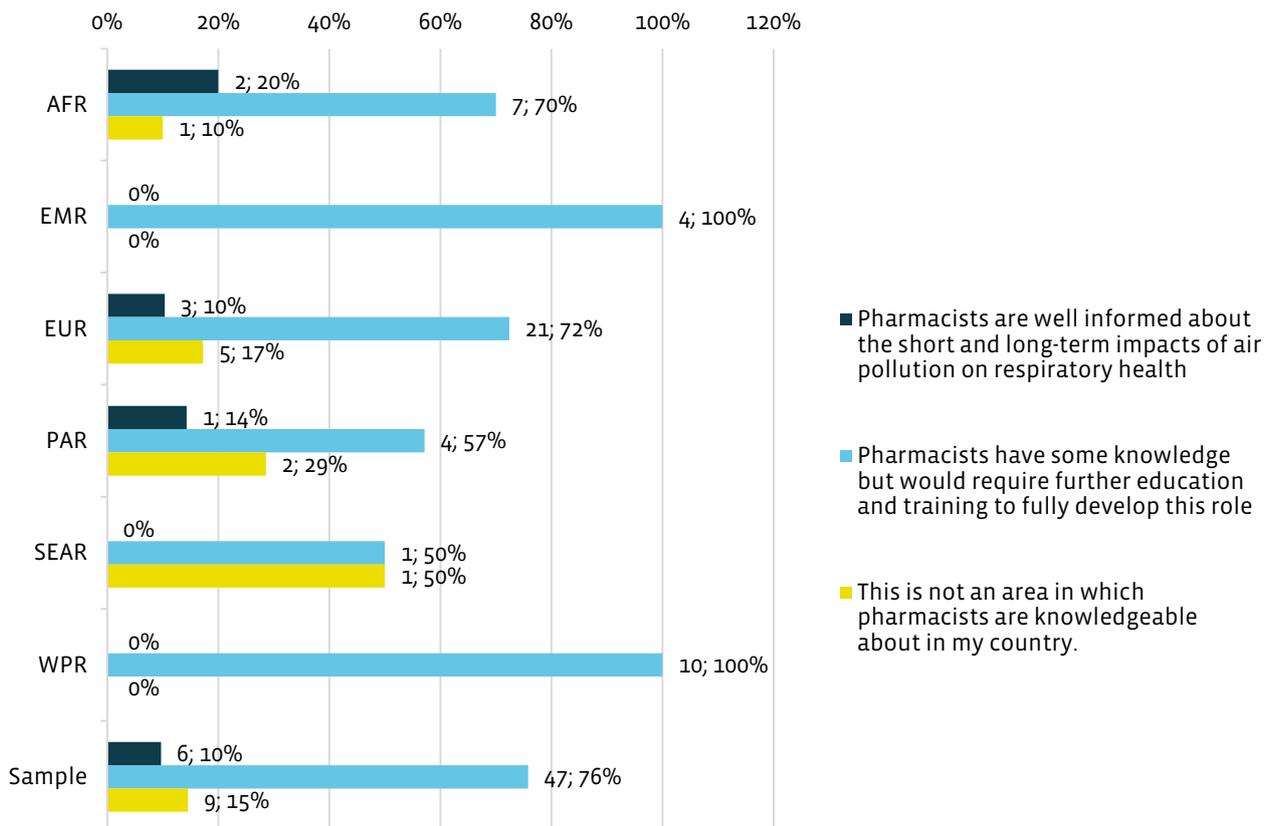
3.1 Pharmacists' understanding of the short- and long-term impacts of air pollution on health

A total of 76% of respondents consider that pharmacists in their country have some level of knowledge regarding the short- and long-term impacts of air pollution on respiratory health, and 15% of respondents answered that this was not an area in which pharmacists in their countries are knowledgeable. In only one of every 10 countries, pharmacists consider that they are well informed about such impacts.

Further breakdown of the data shows the current level of knowledge (and thus, training needs) in each WHO region (Figure 2). Data suggest that a good level of understanding of the impact of air pollution on health only exists in some countries in the African (two countries), European (three) and Americas (one) regions. In the other three regions, a majority of pharmacists have some knowledge in this area but would require further training.

Data from this question clearly indicate the need to expand the competence of pharmacists in relation to the impact of air pollution on respiratory health in all regions for pharmacists to fully take on this role.

Figure 2: Pharmacists' understanding of the short- and long-term impacts of air pollution on respiratory health (n=62)



3.2 Common air pollutant types and related consultations at community pharmacies

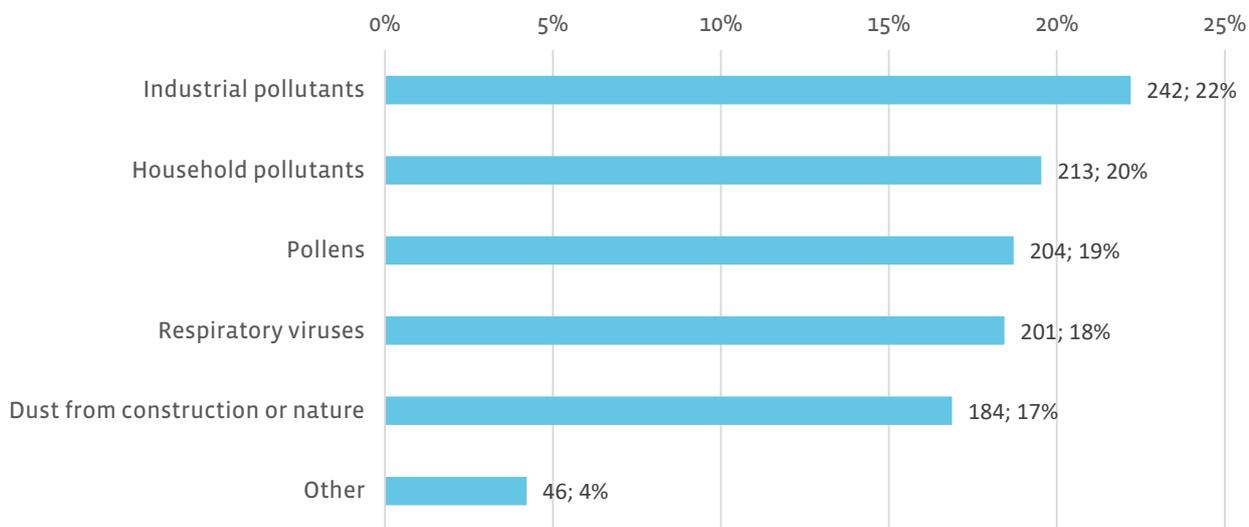
Epidemiological evidence shows an association between outdoor NO₂ levels and respiratory mortality. (8) Also, exposure to NO₂ increases virus-induced exacerbation of asthma. (9) In the same vein, single-day levels of NO₂ inhalation were associated with total respiratory admissions, acute respiratory infections and asthma, (10) and children living in a polluted city had more upper respiratory tract infections per year than those in cleaner cities. (11) For example, 48% of childhood asthma cases in Barcelona, Spain, are attributable to air pollution. (12)

The pollutants emitted from industrial complexes are often associated with the development of allergies, respiratory symptoms and various acute and chronic diseases, such as asthma, COPD and lung dysfunctions. In fact, industrial pollutants represent the major triggers that result in patient consultations with their community pharmacist (Figure 3).

Nevertheless, household pollutants also produce a major impact on health, and are less often associated with the concept of air pollution. For indoor pollutants, it may, in many cases, be more feasible for people to make changes to minimise their presence and thus reduce their impact on respiratory health. Household pollutants are the second highest inducer of pharmacist-patient consultations, as shown in Figure 3.

Community pharmacists are well placed to discuss preventive measures with their patients and minimise the impact of exposure to these pollutants. For example, pharmacists can play a pivotal role in health awareness around the dangers of creating fires that emit smoke and other poisonous gases in the process of cooking, lighting and heating homes.

Figure 3: Frequency of consultations at community pharmacies related to specific types of air pollutants (58 respondents; n=1,090 points*)



*Six points were assigned to every response that ranked a specific air pollutant in first place; five points for second place; four points for third place and so forth. The sum of all points equaled 1,090. This sum was used to calculate the relative position of each air pollutant as a cause for consultations.

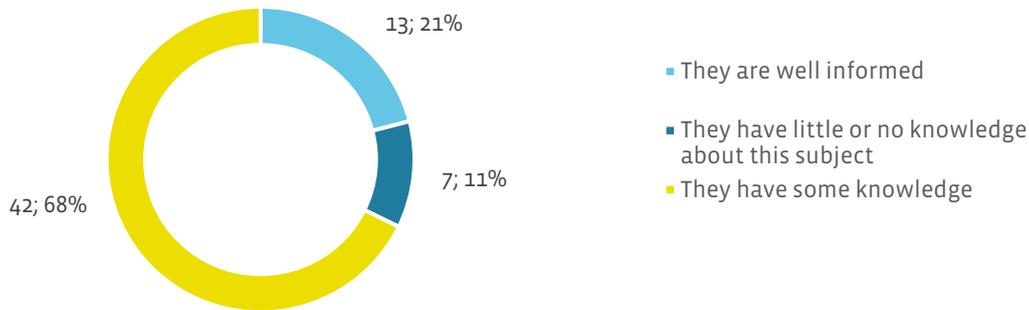
3.3 Pharmacists’ understanding of the protective role of the nose in overall health

The nose is the gateway to the respiratory tract. Understanding how it works to filter the air we breathe is fundamental for pharmacists to adequately advise patients and the public on how to protect themselves from harmful air pollutants and external aggressors.

When asked about pharmacists’ level of understanding of the protective role of the nose, 68% of respondents reported that they have some knowledge in this area, and 21% indicated they are well informed (Figure 4).

Although only 11% reported having little or no knowledge in this area, it may be inferred that additional training at undergraduate level and as CPD would allow for better-informed counselling on nasal hygiene and other protective measures.

Figure 4: Pharmacists' understanding of the protective role of the nose in overall health and how it can be compromised by harmful air pollutants and external aggressors (n=62)



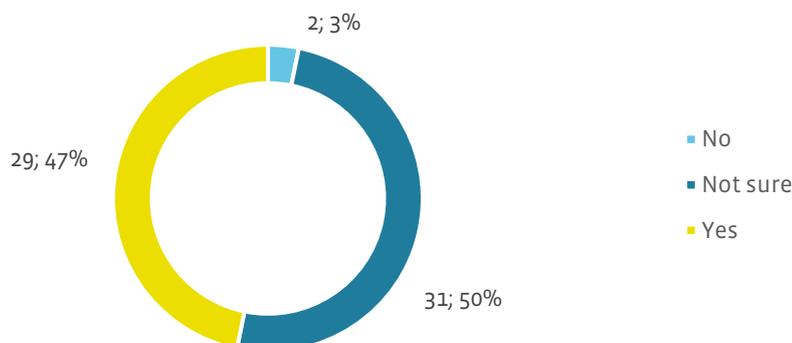
3.4 Pharmacists' understanding of the link between air pollution and immune response

Data suggest that, although 46% of respondents correctly recognised the link between air pollution and immune response to viral infections (including colds, flu and COVID-19), 50% were not sure about this link, and 3% did not think this link exists (Figure 5). These results further illustrate the fact that respiratory health is an area in which further training is required to complement pharmacists' competence to adequately advise patients and the public in this area.

A pharmacist's knowledge of this correlation would prove valuable not just in the educating of patients but also in providing standardised care to patients with viral conditions resident in areas with high fine particulate matter.

Evidence suggests that exposure to air pollutants is not only associated with the dysregulation of immune tolerance but also with the dysregulation of antimicrobial and antiviral immunity. (6) Also, recent evidence supports a clear association between air concentrations of some pollutants and human respiratory viruses interacting to adversely affect the respiratory system, with most results indicating that chronic exposure to air pollutants delays and/or complicates recovery of patients of COVID-19 and leads to more severe and lethal forms of this disease. (7)

Figure 5: Pharmacists' recognition of the link between air pollutants and immune response to viral infections including colds, flu/other influenza-like illnesses, and COVID-19 (n=62)

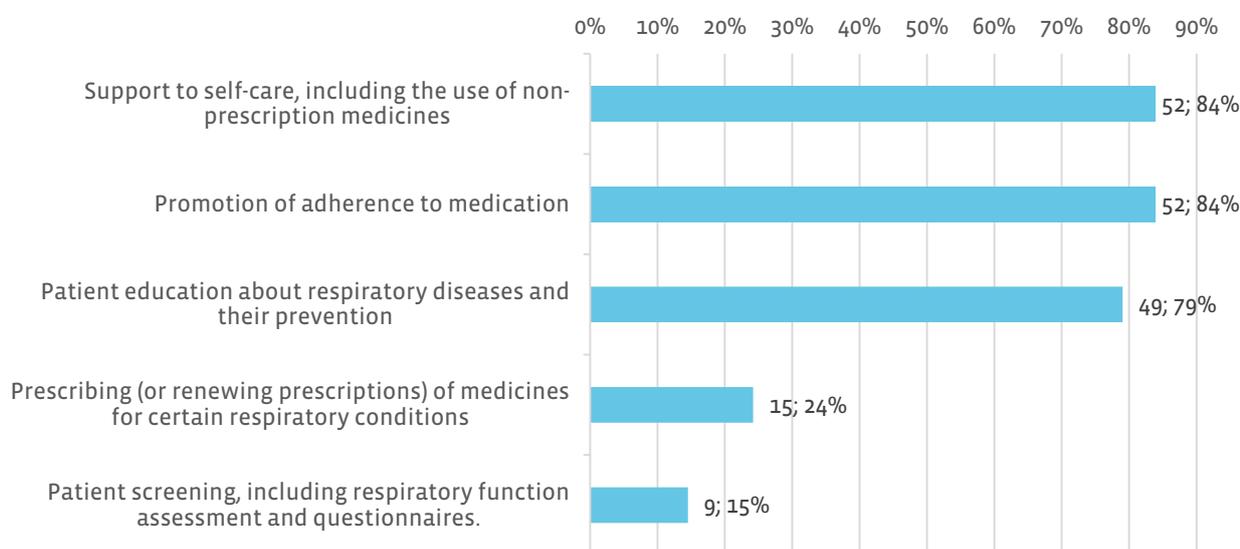


4 The current role of community pharmacists in respiratory care

4.1 Current roles and professional services

Pharmacists carry out various activities in respiratory health through their responsibilities in the provision of primary health care. In the first question of the survey, respondents could select multiple options of what they considered as the professional services they currently provide in their countries. As seen in Figure 6 below, the most commonly reported roles include support to self-care including the use of non-prescription medicines (84% of respondents), and the promotion of adherence to medication (also 84% of the sample). These roles are an integral part of pharmacists' responsibilities as first-line medicines experts.

Figure 6. Current role of pharmacists in respiratory care (n=62)



The two services mentioned above are closely followed by patient education about respiratory diseases and their prevention which was selected by 79% of respondents. Although this percentage suggests that this role is commonly performed by pharmacists, other survey findings presented later in this report indicate that patient counselling on the prevention of respiratory disease and the promotion of respiratory well-being is largely reactive, rather than proactive. It is important to adopt a proactive role in raising public awareness of the impact of air pollution on health.

Data also suggest that screening of patients is not considered a core component of the community pharmacists' role, with only 15% of respondents reporting it.

In nearly a quarter (15; 24%) of responding countries and territories, pharmacists are authorised to prescribe or renew prescriptions of medicines for certain respiratory conditions. In addition, 12 countries (Belgium, Costa Rica, Denmark, Finland, France, Iceland, Israel, Mali, Nigeria, Norway, Portugal and Singapore) also specified other services offered by pharmacists, including:

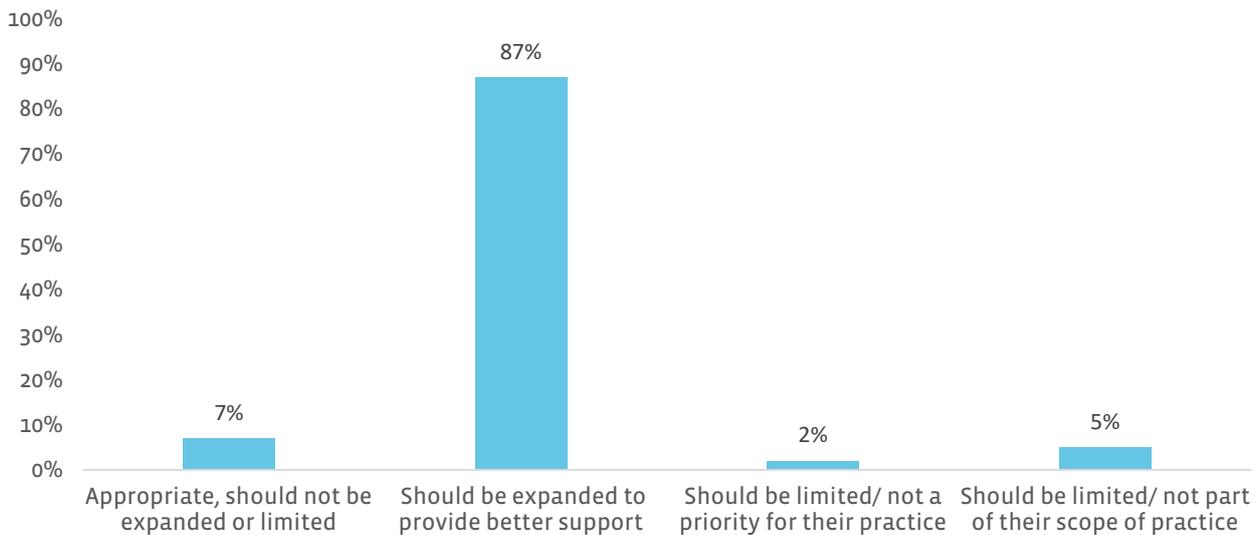
- First aid for asthma attacks, including in emergency situations;
- Guidelines for standard care during pollen season (a period notorious for allergy exacerbation) based on health authorities' preventive recommendations, pollen calendar, etc;
- Vaccine administration;
- Inhalation technique assessment and patient-training on the correct use of inhalers;
- Counselling asthma patients on inhaled corticosteroids with a specific reimbursed service;
- Referral to physician when severe respiratory conditions are detected; and
- Smoking cessation services.

The need for further pharmacist-led interventions in respiratory health was also seen in the following survey question as a large proportion (87%) of respondents agreed that the role of the pharmacist with regard to respiratory care ought to be expanded to provide better support to patients and the community in the light of the increased air pollution in many parts of the world (Figure 7). This is an encouraging finding, as it implies a high level of awareness of the magnitude of the problem of air pollution and the role that is required to prevent and manage respiratory illness in the community.

In fact, the potential role of pharmacists in disease prevention should be harnessed to more optimally manage respiratory health, thanks to, but not limited to, the accessibility and proximity of community pharmacies.

It should, however, be noted that approximately 14% of respondents believe that the scope of pharmacists in respiratory care should not or does not need to be expanded (Figure 7). This suggests the need for further elucidation and advocacy regarding the role of the pharmacist in respiratory care.

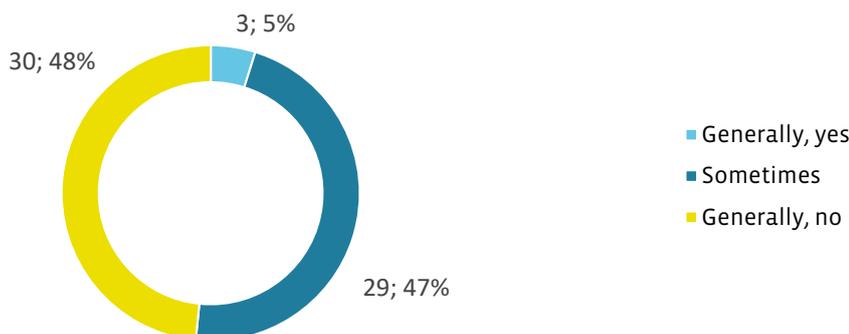
Figure 7. General conceptions of pharmacists about their role in respiratory care (n=60)



4.2 Pharmacists’ proactiveness towards mitigating the impact of air pollution on respiratory health

As shown in Figure 8, only 5% of respondents considered that pharmacists in their country generally and proactively discuss and manage the impacts of air pollution on respiratory health with patients or the public. The remaining respondents were split into two almost equal groups where pharmacists generally do not engage in this type of discussion with patients or the public (48%), and where pharmacists sometimes perform these activities (47%). Data suggest that this type of proactive approach by pharmacists is not part of routine practice in nearly all countries.

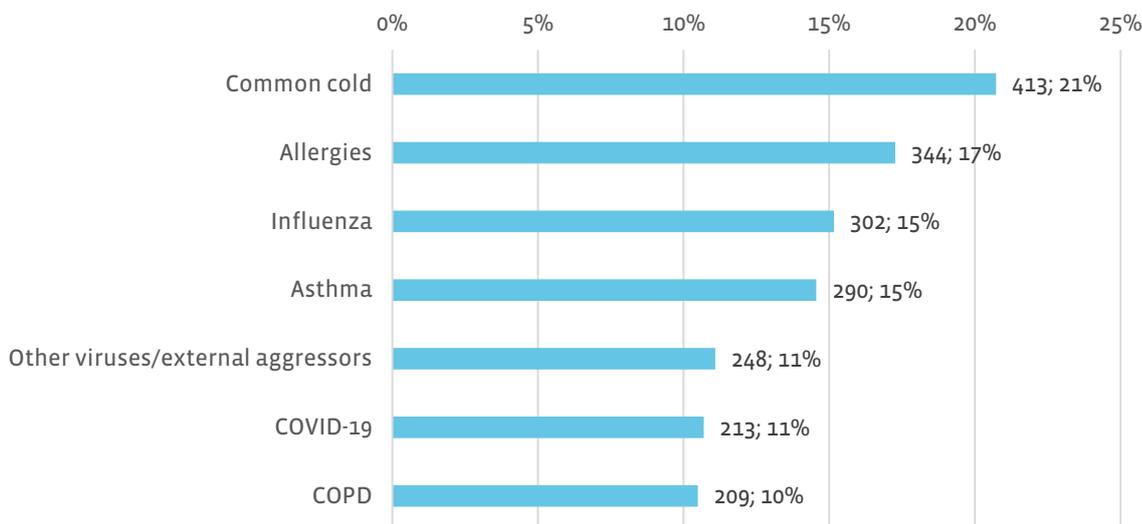
Figure 8: Proactiveness of pharmacists in discussing and managing the impacts of air pollution on respiratory health (n=62)



4.3 Frequency of consultations per respiratory condition

In terms of the frequency of consultations related to various respiratory diseases in community pharmacies, the common cold ranked as the most commonly consulted condition, followed by allergies, influenza, asthma, COVID-19, COPD and other respiratory viruses (see Figure 9).

Figure 9. Frequently occurring respiratory conditions based on consultations at community pharmacies (59 respondents; n=1,992 points*)



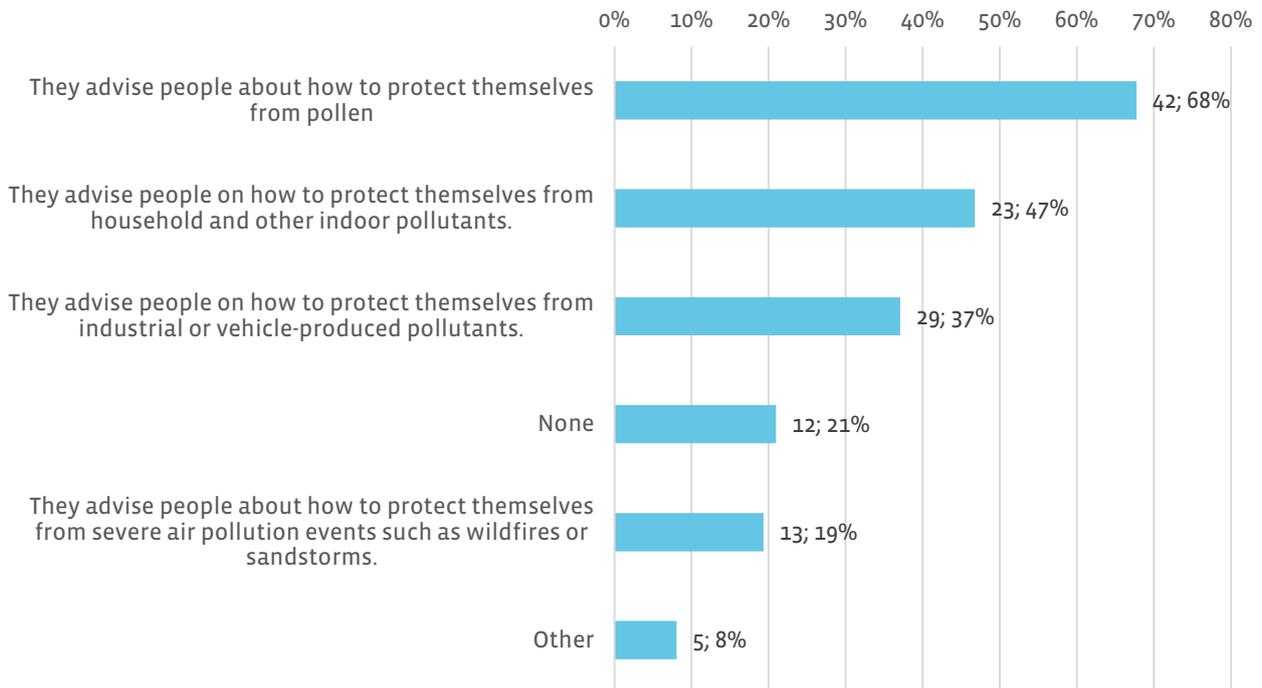
*Eight points were assigned to every response that ranked a disease in first place; seven points for second place; six points for third place and so forth. The sum of all points equaled 1,992. This sum was used to calculate the relative position of each disease.

4.4 Types of advice currently provided by pharmacists on air pollutant exposure

Although a broader role by pharmacists could be played in the future to minimise the impact of air pollution on respiratory health, advising people on how to protect themselves from certain types of air pollutants is already part of their practice in many parts of the world. Specifically, the study found that advice on protection from pollens was reported as the most common type of preventive counselling they offer (Figure 10). Advice on protection from both indoor and outdoor (industrial or produced by vehicles) pollutants is provided by pharmacists in less than half of respondent countries and territories, with over one fifth of respondents indicating that pharmacists do not yet provide any type of advice in this area.

These findings exhort professional organisations to promote and support the transformation of pharmacy practice to fully integrate the area of respiratory care in the daily roles of community pharmacists.

Figure 10: Types of advice or recommendations pharmacists currently provide to patients or the public relative to air pollutant exposure (n=62)



4.5 Non-pharmacological measures recommended by pharmacists to support respiratory well-being

As shown on Figure 11, nasal sprays are the most common non-pharmacological measure recommended by community pharmacists in 82% of 61 responding countries and territories, with nasal washes being the second most recommended measure (73%). Both are important measures to promote nasal hygiene and preserve the protective function of the nose.

The use of masks, which has now widely extended around the world as a preventive measure against COVID-19, ranked fifth. In addition to being an invaluable device to help control the dissemination of respiratory infections, face masks also play an important role in protecting the user from airborne pollutant particles. (13)

Other forms of non-pharmacological measures recommended by pharmacists in their respective countries and territories were reported by three respondents and included good environmental hygiene, avoidance of allergens and rest.

With regard to nasal washing, although this is the most often recommended nasal hygiene method, 61% of respondents reported that they recommend this measure sometimes, as opposed to often (21%) (Figure 12). These findings suggest that advising on the importance of nasal hygiene as a prevention method against the harmful impact of air pollution is not yet fully integrated in community pharmacists' practice as an important measure to promote respiratory well-being.

Figure 11: Non-pharmacological measures routinely recommended by community pharmacists (n=61)

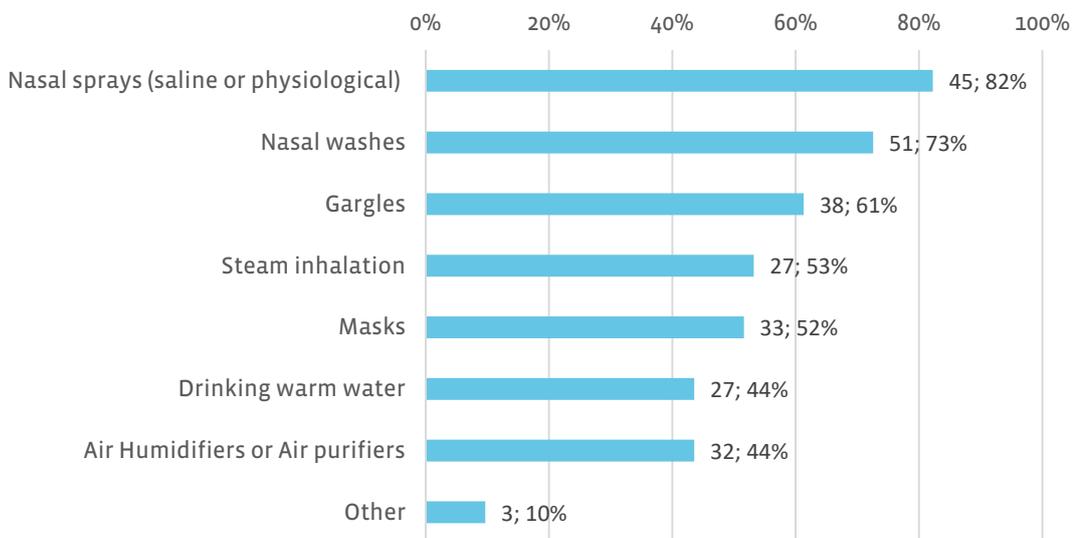
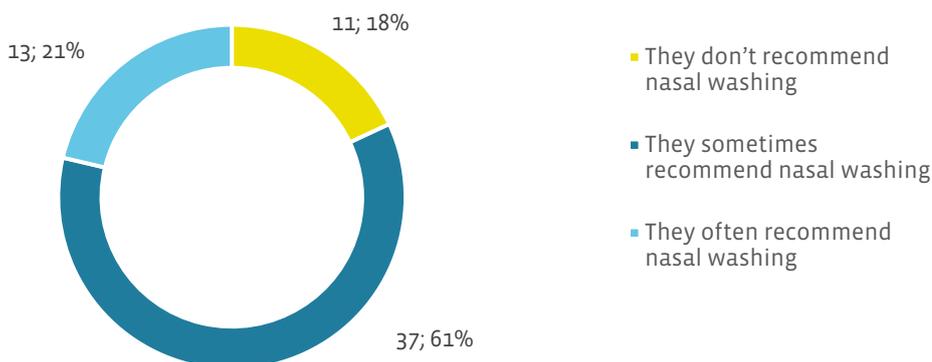


Figure 12: Extent to which pharmacists in your country recommend nasal washing as a method to remove particles such as air pollutants from the nose (n=61)



Seasonal changes play a direct role in the exacerbation of respiratory distress. The common cold, depending on the region and climate, is aggravated during the winter season of temperate regions and the harmattan/dry season of the tropical regions. Allergies are high when pollination occurs at various intervals of different plant cycles, which could explain the increase in consultations on account of allergies.

With regard to COVID-19, it was somewhat surprising to see that it ranked sixth in the frequency of consultations at community pharmacies, when considering that this survey was conducted between May and June 2020, in the midst of the pandemic. This could possibly be related to the fact that, in many countries, there were massive public awareness campaigns about COVID-19 and in many places, health authorities provided hotlines for addressing queries. Also, although pharmacies did play a role in providing information on COVID-19, symptomatic individuals were advised not to go to pharmacies but rather to present directly at healthcare facilities for testing and follow-up care. In addition, in several countries pharmacists were not equipped or authorised to screen or provide consultation, triage or referral services for COVID-19.

Finally, other lower-ranking respiratory conditions, such as asthma and COPD, are usually chronically managed and therefore may generate a lower number of consultations than acute illnesses.

In any case, what data from this question suggest is that the common cold, allergies, influenza and asthma are, in this order, the diseases that most require the development of practice-support guidelines.

4.6 Pharmacists' role in screening patients for respiratory conditions

As suggested by the data, community pharmacies are significantly underutilised in the detection and management of respiratory disorders, particularly those induced by air pollutants. In 57 (95%) out of 60 respondents, pharmacist-led screening services to assess the impact of air pollution on patients' respiratory health are uncommon (Figure 13). This represents a unique opportunity for pharmacist contribution.

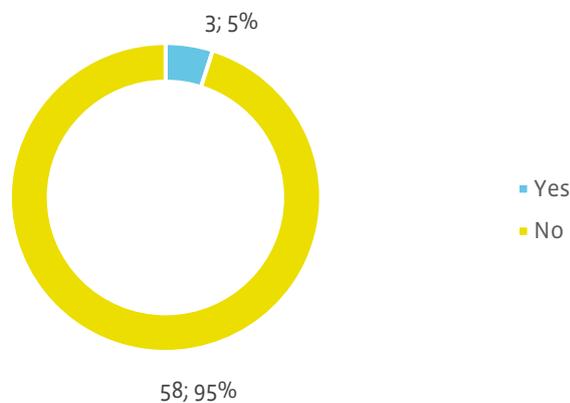
The role of pharmacists in diseases screening in the community has been equally highlighted in previous FIP publications and statements of policy.

According to the report "Beating non-communicable diseases in the community: The contribution of pharmacists", there are several studies and publications on the role of community pharmacists in screening patients for various NCDs. These studies suggest that, if there is a screening intervention at the community pharmacy level, there is prompt referral of suspected cases to a general practitioner or specialist, increased disease awareness and higher patient willingness to initiate and adhere to treatment. These studies also indicated that community pharmacist interventions were associated with higher diagnosis rates and with a more efficient use of GP visits, namely by avoiding unnecessary referrals. (14)

The FIP statement of policy on the role of pharmacists in NCDs also states the commitment of pharmacists and their organisations to "improving identification of NCD patients through pharmacy-provided screening programmes for symptom assessment and, if needed, quality assured and validated point-of-care measurements (e.g. waist-circumference, blood pressure, glycaemia, cholesterol, etc.)". (15)

Naturally, in addition to the required tools and devices and the appropriate training for screening services, it is important to communicate and share information in a secure way with physicians and other health care professionals, ideally by inputting the screening findings in the patient's shared (electronic) health record — and this can be an obstacle in several countries.

Figure 13. Involvement of community pharmacists in the screening of respiratory conditions (n=61)



5 Drivers and barriers to maximising pharmacists’ role in respiratory care

The third part of this study identifies the perceived barriers in terms of gaps in knowledge, conditions and tools for community pharmacists to manage the impact of air pollution on respiratory care, as well as the drivers and requirements for pharmacists to fully embrace such roles.

Community pharmacists are in a unique position to contribute to respiratory health. Their accessibility and knowledge of medicines and health conditions makes them reliable healthcare professionals. Furthermore, their proximity to patients allows them to perform the necessary follow-ups and monitor for signs, symptoms and adverse effects. With regard to respiratory health and external aggressors and harmful air pollutants, community pharmacists are well placed to offer preventive measures, provide reliable information on respiratory conditions, recommend non-pharmacological measures as well as educate and counsel patients on treatments for respiratory health issues.

5.1 Barriers to pharmacists’ role in respiratory care

The survey investigated the perceived barriers by pharmacists’ organisations of what is hindering pharmacists from expanding their role in this area.

As shown in Figure 14, the most commonly reported barrier (for 64% of respondents) to undertaking a proactive role in respiratory health was the perceived lack of knowledge and need for increased training, which suggests a need for strengthened curricula and/or continuing education in the field of respiratory health and air pollution. This is consistent with other survey findings.

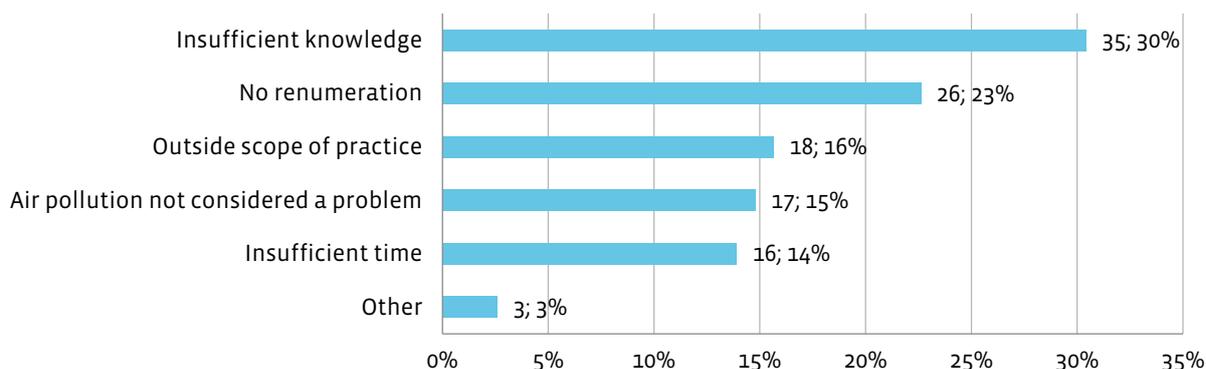
The second most important barrier (for 47% of respondents) is the lack of an appropriate remuneration model that renders these savings-generating services sustainable, and adequately recognises, compensates and incentivises the investment in training and time that pharmacists must make to deliver such services.

Other barriers reported by one third or less of respondents included the perception that this is outside the scope of practice of pharmacists, that it is not a priority problem in their country, or that pharmacists do not have the time to offer these services. However, as expressed in the introduction, the magnitude of this threat to global health demands new solutions from all health systems and healthcare professions, and pharmacists are ideally placed to step up and embrace these new roles as frontline health workers.

These data on the perceived barriers also point to the need to demonstrate the added value of pharmacists in this area through practice-based research and reflection on the expanding role of community pharmacists.

It should be noted that respondents could select multiple answers to this question. Therefore, the percentages in the chart below express the share of the total number of marked options, to express the weight of each option among the total.

Figure 14: Barriers to the proactiveness of pharmacists in respiratory health (55 respondents; multiple options could be selected; n=115 answers)



5.2 Capacity level of pharmacists for respiratory health decision-making

There are varying capacity levels for pharmacists from responding organisations on how to proceed with care for respiratory conditions. While pharmacists in most of the countries in the study (34 respondents; 57%) possess a certain degree of knowledge to differentiate self-limiting conditions that can be managed at the community pharmacy level from those that require evaluation by a GP or a specialist physician, they lack the necessary tools to support them with this important form of decision making.

For approximately 17% of respondents in the sample, pharmacists are not legally authorised to perform this type of screening and triage of patients, which prevents them from completing these acts regardless of whether they are sufficiently trained to perform them or possess the necessary tools to facilitate the process. This is an important limitation to a role that could have a significant impact in terms of reducing the pressure on GPs or emergency rooms, and thus contribute to a greater efficiency of healthcare systems.

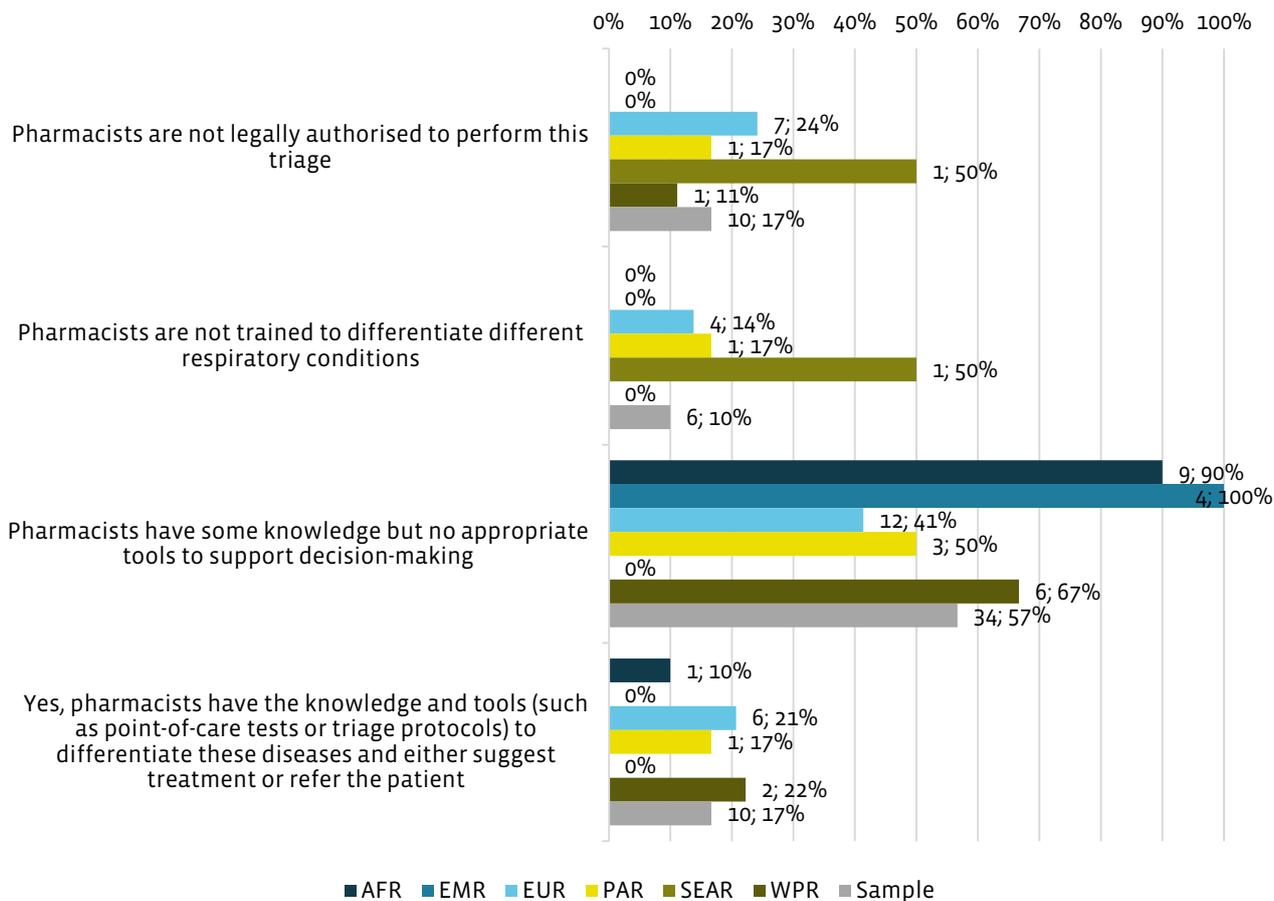
Conversely, for another 17% of respondents, pharmacists are sufficiently trained to perform this type of disease screening or triage role, and possess the necessary tools to do so. These results suggest that, although this situation exists in 10 countries, this form of harnessing the potential of community pharmacists for this important triage role is only present in less than one fifth of the countries and territories. This points to the need for greater advocacy for regulatory frameworks that support such roles of pharmacists as first-line healthcare practitioners.

In six countries (10% of the sample), pharmacists are not sufficiently trained to differentiate respiratory conditions and perform a triage role. This points to the need to consider the curriculum of undergraduate pharmacy education in these countries, and/or to develop an offer of CPD opportunities to fully harness the capacity of community pharmacists for such primary health care roles.

When analysing responses per WHO region, we observe the following:

- In the African and the Eastern Mediterranean regions, the barriers to triage roles do not seem to be related to the lack of regulatory support or appropriate training, but to the lack of tools to support these roles.
- The European and the Americas regions follow a similar pattern: 21% and 17% of countries, respectively, reported that pharmacists are fully equipped to perform triage roles; however, more screening tools are needed in 41% and 50% of countries, while additional training is required in 14% and 17% of countries of the two regions. Legal barriers exist to this triage role in nearly a quarter of European countries and in 17% of countries in the Americas.
- In South-East Asia, while recognising that the sample was quite small (two countries), these roles cannot be performed due to lack of legal support or adequate training (50% each).
- In the Western Pacific region, in more than two thirds of countries, there is a need for additional tools to support patient screening roles.

Figure 15. Current capacity of pharmacists in differentiating self-limiting conditions that can be managed in the community, from those that require follow up by a GP (n=60)

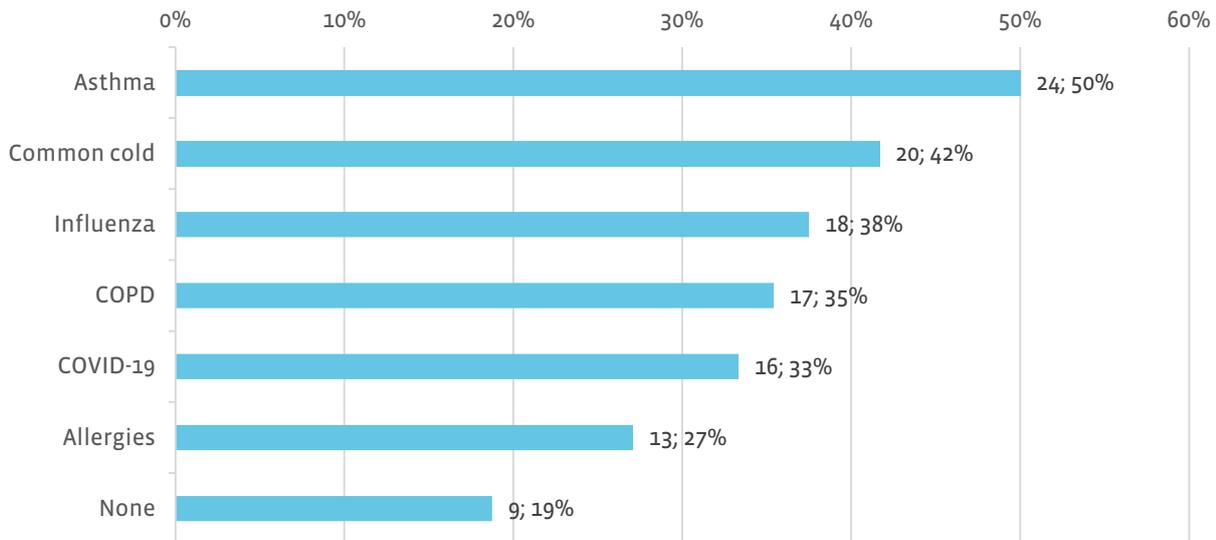


5.3 Availability of practice-support guidelines and standards

Without a doubt, the adoption of these new roles would benefit from the existence of didactic and practice-support resources that would not only facilitate the work of individual practitioners, but also ensure consistence of practice across the profession. The availability of robust protocols, guidelines and standard operating procedures is imperative in supporting pharmacists in fulfilling their roles in respiratory care and providing evidence-based interventions.

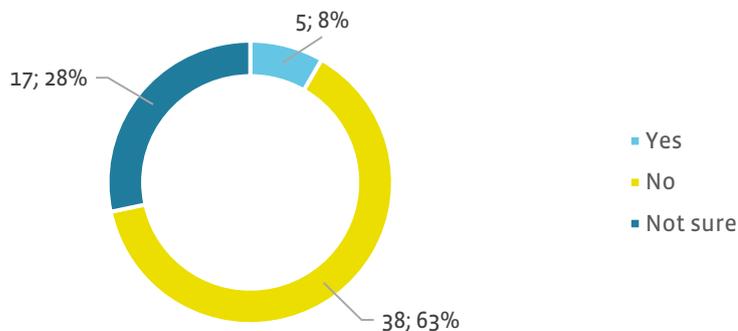
Respondents were asked to state which guidelines or practice standards were available in their country for a range of respiratory diseases. As Figure 16 shows, asthma was the condition associated with the highest number of such resources (available in 24 countries; 50%). Nevertheless, data suggest that, in most countries and territories, there are no practice-support guidelines for diseases such as the common cold, influenza, COPD, COVID-19, or allergies. Also, in nearly one-fifth of the responding countries, no guidelines at all are available. This points to the absolute need for professional organisations, including FIP, to develop such guidance to support this much-needed transformation of community pharmacy practice.

Figure 16. Respiratory conditions for which practice guidelines for pharmacists are currently available (n=48)



As shown in Figure 17, nearly two-thirds of respondents (63%) stated that there are no guidelines covering the impact of air pollution on health for pharmacists in their respective countries, while another 28% of respondents claimed that they were unsure about whether such guidelines explicitly acknowledge and explain the harmful impact of air pollution on health, and how pharmacists can integrate that awareness in their practice. These results suggest a lack of adequate guidance for pharmacists regarding the effects of air pollution on health. This finding is also aligned with the scarcity of practice-support guidelines for most respiratory conditions in a majority of countries, as shown in Figure 16.

Figure 17: Impact of air pollution captured by national pharmacy guidelines (n=60)



As the data from the two previous Figures imply, intensified efforts towards creation of robust, adequate guidelines based on the significant repercussions of air pollution on respiratory health would benefit pharmacists in advancing their role as front-line healthcare practitioners and integral members of the communities they serve.

5.4 Desired changes and requirements for an expanded role for pharmacists in respiratory care

Pharmacists were asked about the changes they would like to see in their role in respiratory care, and Figure 18 shows that the most desired changes are to have more tools and devices to support their role in patient screening and triage (77%), to have increased competence to identify and differentiate respiratory conditions (73%) and to advise patients on the impact of air pollution on their health (72%).

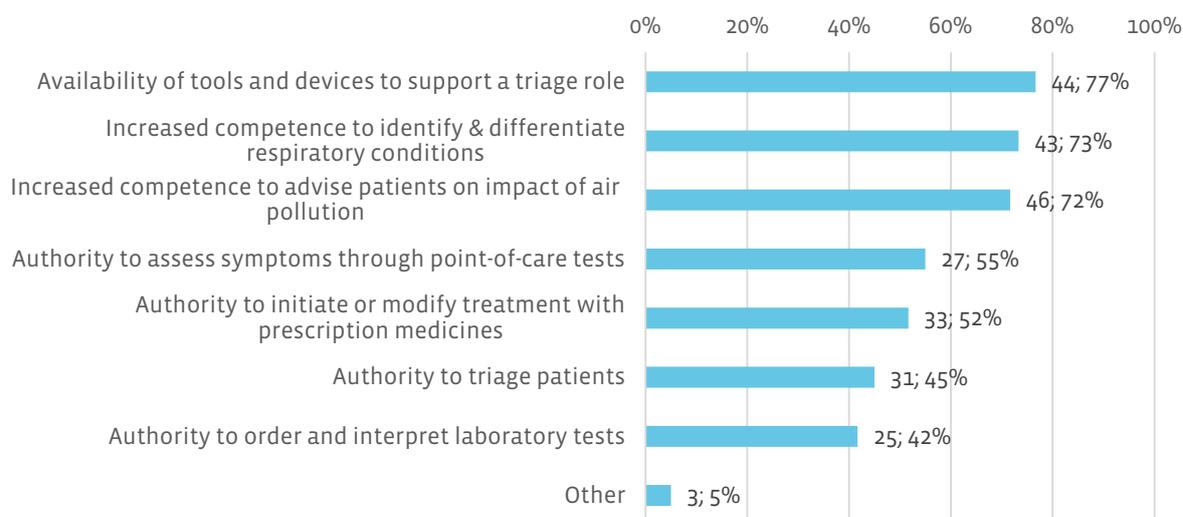
The next four positions in the ranking are occupied by changes related to regulatory aspects. This reaffirms the findings from the previous question, that the main enablers of a broader role by pharmacists in respiratory

care would be more targeted training and more resources to support their practice, including guidelines, tools and devices.

However, there is more to achieving these outcomes beyond readily accessible tools in community pharmacies as well as sufficient training of pharmacy personnel. While pharmacist-led screening and triage services are necessary and should be continued, there is potential for pharmacists to actively contribute to the health of their patients, notably by ordering and interpreting laboratory tests, assessing signs and symptoms through point-of-care testing, and modifying prescriptions for medication therapy when appropriate. This enhanced scope of practice would allow optimal and timely management of respiratory conditions at the community level.

It should be noted that respondents could select multiple answers to this question.

Figure 18. Desired changes and requirements for an expanded role by pharmacists in respiratory care (n=62)



5.5 Expected changes in the management of respiratory symptoms in the community post COVID-19

Through open text answers, respondents were asked to describe the expected changes in the role of pharmacists in managing patients with respiratory symptoms in the community after the COVID-19 pandemic. The goal was to ascertain whether the pandemic had changed their awareness of their potential contribution in this important area of primary health care.

Several respondents referred to the pivotal role that community pharmacies played during the first months of the pandemic. However, responses also reflected a heightened awareness that their role could be amplified as front-line health workers. The value of expanded professional services such as supporting disease preventive measures, offering remote consultations, administering vaccines (against COVID-19 when vaccines become available, but also against other diseases such as the seasonal influenza or pneumococcal disease, for example) and others became very clear not only to pharmacists themselves, but also to the public and to policy-makers in many parts of the world. This is evidenced by the many regulatory changes in pharmacists' scope of practice that were introduced in several countries to support these new roles.

To summarise the open text answers, the most commonly referred changes expected after the pandemic by responding organisations are related to:

- Increased recognition of the role of pharmacists in primary care and in respiratory care in particular;
- Expanded authority and scope of practice to manage respiratory conditions in the community;
- Expanded authority to vaccinate, to prevent several respiratory diseases;
- More use of technology for remote consultations and patient care;

- More tools to support pharmacists in identifying and screening for respiratory diseases, including more point-of-care tests;
- Tools and protocols for distinguishing COVID-19 from other respiratory diseases, like the flu;
- Additional precaution and protection when demonstrating inhaler technique; and
- Prevention and early signalling of respiratory symptoms in patients.

The complete list of responses provided by 41 respondents can be found in [Appendix 2](#).

5.6 Existence of appropriate conditions for pharmacists' role in respiratory care

The survey asked respondents whether pharmacists are well equipped to discuss the impact of air pollution on respiratory health with patients and the public in terms of practice-support tools, incentives and regulatory support.

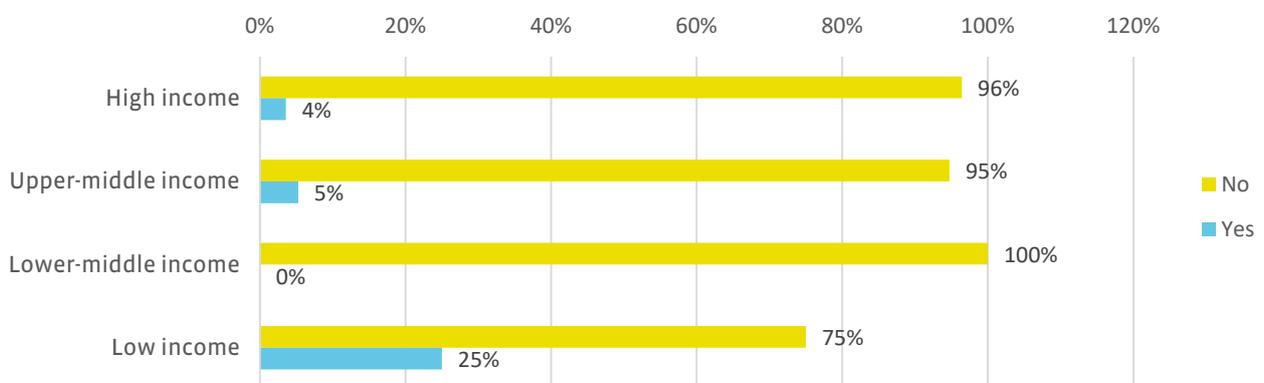
Only 7% of respondents affirmed possessing the necessary tools (information material, point-of-care tests, devices) to support their role. Regarding the appropriate incentives to perform the role, these are only available to 5% of the sample's respondents (three countries or territories). Such incentives include appropriate remuneration models, CPD opportunities and adequate recognition of this role (see Table 2). When analysed by country income level, data suggest that the lack of incentives is a cross-cutting barrier across all income-levels, with low-income countries actually perceiving this lack of incentives to a lesser extent than in wealthier nations (Figure 19).

Approximately three quarters of countries and territories do not currently have the appropriate regulatory framework to support pharmacists in this role, which calls upon institutional and legislative changes to regulate this function.

Table 2. Existence of appropriate conditions for pharmacists to discuss the impact of air pollution with patients and the public

	Yes	No
Pharmacists have the necessary tools (information material, point-of-care tests, devices) to support their role in advising the public and patients about the impact of air pollution on respiratory health (n=61)	4 (7%)	57 (93%)
Pharmacists have the appropriate incentives to perform this role (n=59)	3 (5%)	56 (95%)
Pharmacists have the regulatory authority to perform this role (n=58)	14 (24%)	44 (76%)

Figure 19: Pharmacists have the appropriate incentives to perform this role (n=59)



5.7 Tools and devices to aid pharmacists in their role in respiratory health

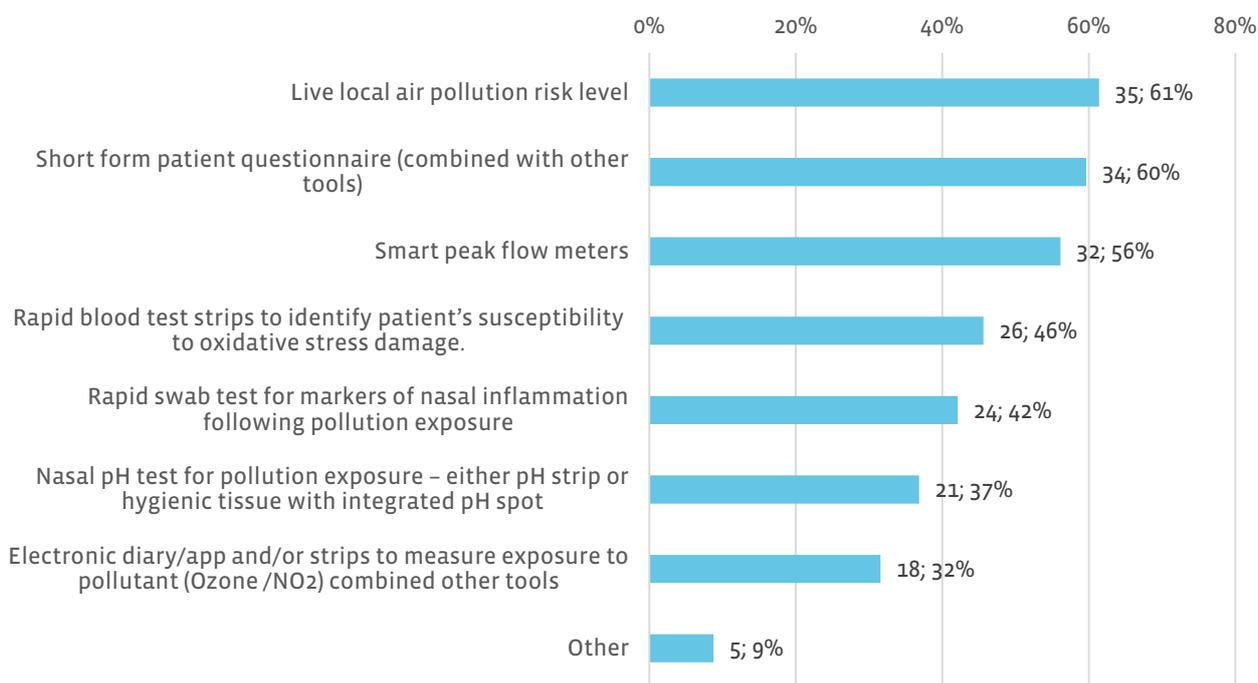
When pharmacists were asked which simple decision-making tools or devices would help them identify patients at risk from air pollution, their most frequent responses were less related to devices or complex procedures, but rather to possessing information to adequately advise the patient. They want updated information about the local and real-time risk for health from air pollution, so that they can act in a timely fashion (61% of respondents), and information from patients themselves, collected via a standard questionnaire (60%) (see Figure 20).

In terms of point-of-care testing, respondents most frequently pointed to the value of smart peak flow meters (56% of respondents) and rapid blood test strips to identify patient’s risk or susceptibility to oxidative stress damage (46%).

Other screening tools included rapid swab test for markers of nasal inflammation/irritation following pollution exposure (42%), nasal pH tests for pollution exposure (either pH strip or hygienic tissue with integrated pH spot) (37%) and, finally, the use of electronic diaries/apps and strips to measure exposure to pollutants (ozone/NO₂) (32%).

It should be noted that respondents could select multiple answers to this question. Therefore, the percentages in Figure 20 below express the share of the total number of marked options, to express the weight of each option among the total.

Figure 20: Simple decision-making tools or devices to help pharmacists identify patients at risk from air pollution (n=57)

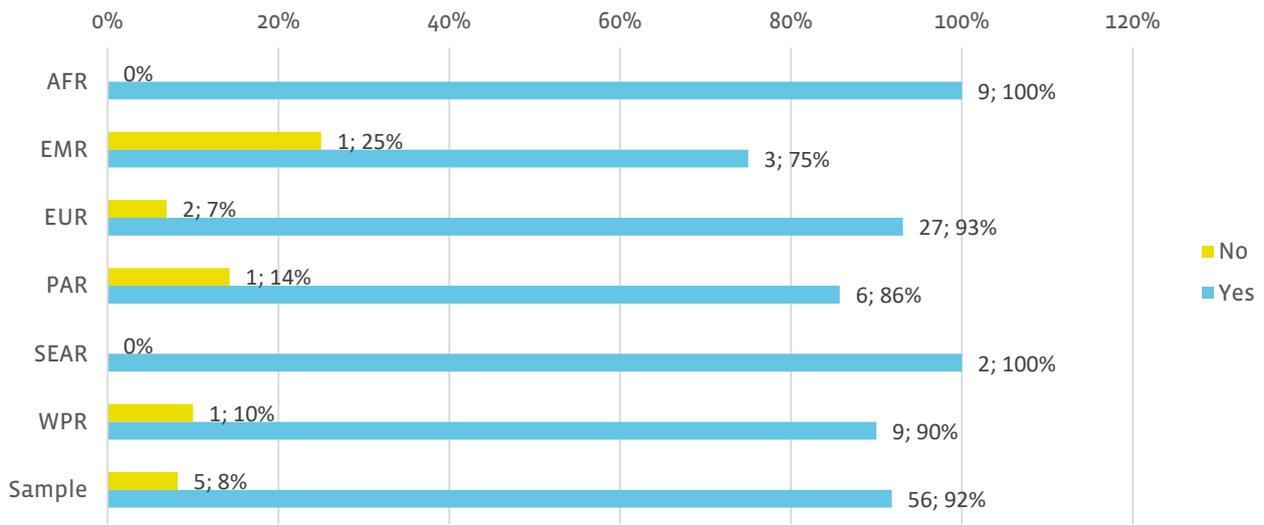


All these tools and others may be valuable in pharmacy practice to support the adoption of these new roles and the expansion of the range of primary health care services offered by community pharmacies. For further information about the use of these methods and devices, we recommend watching Dr Sundeep Salvi’s presentation on this subject at the symposium “The impact of air pollution on respiratory health and vulnerability to COVID-19. What can community pharmacists do to help?” that FIP organised on 14 September 2020, available [here](#).

5.8 Pharmacists' prospective role in respiratory care

Pharmacists are confident of their capabilities in the respiratory care field. In the final question of this survey, FIP asked responding organisations whether they agreed with the statement that pharmacists want to evolve their role as trusted advisors and provide value to patients through education and proactive care in the area of respiratory care and air pollution. The result was that 91.8% of respondents support this statement, with consistently high favourable rates across all WHO regions (Figure 21).

Figure 21. Agreement with the statement that pharmacists want to evolve their role as trusted advisors and provide added value to patients through education and proactive care in the area of respiratory health and air pollution (n=61)



6 Summary and conclusions

Community pharmacists' role in primary health care and disease prevention is underutilised around the world. The immense potential of using the accessibility and highly skilled workforce of community pharmacies should be harnessed to advance the prevention agenda, leading to better and healthier lives, reducing the pressure on health systems and contributing to their efficiency and sustainability.

As stated in the introduction, air pollution and climate change are a major threat to global health and require responses from health systems and from all health professions. Pharmacists' position in the community makes them instrumental in raising the public's awareness of this significant threat to their health and to support them in mitigating the risks posed by air pollution on respiratory health.

This is not a new threat, but it is one that has become increasingly harmful at an accelerated pace, and one that exhorts the pharmacy profession to expand its scope of practice to embrace new roles and responsibilities.

With increased access to evidence-based guidelines and increased availability of practice-support tools and devices, strengthened educational and regulatory frameworks, and improved funding models to ensure the sustainability of these services, the pharmaceutical profession stands to contribute meaningfully to tackling air pollution and minimising its effects on the health of patients.

However, appropriate conditions need to be met for these roles to be fully integrated in pharmacy practice:

- More education and training, both at undergraduate and CPD levels, are needed to develop the necessary competence;
- Adequate remuneration models should underpin the sustainability of these services and provide the incentives to adopt them broadly into mainstream practice;
- More public awareness of this health threat as well as these new roles of pharmacists is needed;
- Appropriate guidelines, regulatory support and screening tools are essential to support these roles; and
- Better interprofessional collaboration, supported by shared electronic patient records, would lead to better patient care outcomes.

FIP will continue to advocate for an expanded role for pharmacists to mitigate the impact of air pollution in respiratory health, and will work further to support its member organisations and pharmacists around the world with the guidance and professional resources they need.

7 Special thanks

FIP would like to thank all organisations that kindly contributed to this study:

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Armenia

Pharmprogress NGO

Australia

Pharmaceutical Society of Australia

Austria

Austrian Chamber of Pharmacists

Belgium

Association Pharmaceutique Belge

Bosnia & Herzegovina

Chamber of Pharmacists of the Federation of Bosnia & Herzegovina
Pharmaceutical Society of the Republika Srpska

Brazil

Brazilian Federal Council of Pharmacy

Bulgaria

Bulgarian Pharmaceutical Union

Cameroon

National Council of Pharmacists in Cameroon

Canada

Canadian Pharmacists Association

Cape Verde

Order of Pharmacists of Cabo Verde

China

Chinese Pharmaceutical Association

Colombia

Colegio Nacional de Químicos Farmacéuticos de Colombia

Costa Rica

Colegio de Farmacéuticos de Costa Rica

Cyprus

Cyprus Turkish Pharmacist Association

Denmark

Association of Danish Pharmacies

Fiji

Fiji Pharmaceutical Society

Finland

Association of Finnish Pharmacies
The Finnish Pharmacists Association

France

French Chamber of Pharmacists

Gabon

Ordre National des Pharmaciens du Gabon

Germany

Federal Union of German Associations of Pharmacists

Ghana

Pharmaceutical Society of Ghana

Greece

Pharmacists' Association of Kozani

Hong Kong SAR, China

Pharmaceutical Society of Hong Kong

Hungary

Hungarian Society for Pharmaceutical Sciences

Iceland

Pharmaceutical Society of Iceland

India

Indian Pharmaceutical Association

Ireland

Irish Pharmacy Union

Israel

Pharmaceutical Association of Israel

Italy

Federfarma

Japan

Japan Pharmaceutical Association

Jordan

Jordan Pharmacists Association

Korea (Rep. of)

The Korean Pharmaceutical Association

Lebanon

Lebanese Order of Pharmacists

Malaysia

Malaysian Pharmaceutical Society

Mali

Conseil National de l'Ordre des Pharmaciens du Mali

Montenegro

Pharmaceutical Chamber of Montenegro

Netherlands

The Royal Dutch Pharmacists Association

New Zealand

Pharmaceutical Society of New Zealand Inc.

Nigeria

Association of Community Pharmacists of Nigeria
Pharmaceutical Society of Nigeria

North Macedonia

Pharmaceutical Chamber of Macedonia

Norway

Norwegian Pharmacy Association

Pakistan

Pakistan Pharmacists Association

Poland

Polish Pharmaceutical Society

Portugal

Associação Nacional das Farmácias
Portuguese Pharmaceutical Society — Ordem dos Farmacêuticos

Romania

Ethica Independent Pharmacies Association

Rwanda

Rwanda Community Pharmacists Union

Sierra Leone

Pharmaceutical Society of Sierra Leone

Singapore

Pharmaceutical Society of Singapore

South Africa

Pharmaceutical Society of South Africa

Spain

Consejo General de Colegios Oficiales de Farmacêuticos

Sri Lanka

Pharmaceutical Society of Sri Lanka

Sweden

Swedish Pharmacists Association

Tanzania

Pharmaceutical Society of Tanzania

Turkey

Turkish Pharmacists' Association

Ukraine

All-Ukrainian Pharmaceutical Chamber

United Kingdom

Royal Pharmaceutical Society

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Uruguay

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Vietnam

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Yemen

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Appendix 1: Survey questionnaire (English version)

PART 1: The current role of community pharmacists in respiratory care

1. What is the current role of community pharmacists in respiratory care in your country? (mark all that apply)
 - Patient education about respiratory diseases and their prevention
 - Patient screening, including respiratory function assessment and questionnaires
 - Support to self-care, including the use of non-prescription medicines
 - Prescribing (or renewing prescriptions) of medicines for certain respiratory conditions
 - Promotion of adherence to medication
 - Other. Please specify: _____

2. How would you best describe the role of pharmacists in respiratory care in your country?
 - Proactive
 - Somewhat proactive
 - Neutral
 - Somewhat reactive
 - Reactive (in response to patients' queries)

3. How do pharmacists currently feel about their role in respiratory care?
 - Their role in respiratory care should be expanded to provide better support to patients and the community, also considering increased air pollution in many parts of the world
 - Their current role is appropriate and does not need to be expanded nor limited
 - Their role in respiratory care should be limited as it is not part of their scope of practice
 - Their role in respiratory care should be limited as it is not a priority for their practice

4. Please rank the following respiratory diseases in terms of the approximate frequency of related consultations at the pharmacy.
 - Common cold
 - Influenza
 - COVID-19
 - Other viruses
 - Allergies
 - COPD
 - Asthma
 - Other. Please specify: _____

5. For which conditions are there guidelines for respiratory care by pharmacists in your country? (please use the box below to share URLs where possible)
 - Common cold
 - Influenza
 - COVID-19
 - Other viruses
 - Allergies
 - COPD
 - Asthma
 - Other. Please specify: _____

Box for sharing URLs

6. When patients present with respiratory symptoms at the pharmacy, are pharmacists in your country generally prepared to differentiate self-limiting conditions that can be managed in the community from those that require follow up by a GP or a specialist physician?
 - Yes, pharmacists have the knowledge and tools (such as point-of-care tests or triage protocols) to differentiate these diseases and either suggest treatment or refer the patient
 - Pharmacists have some knowledge but no appropriate tools to support decision-making
 - Pharmacists are not trained to differentiate different respiratory conditions
 - Pharmacists are not legally authorised to perform this triage
 - Other. Please specify: _____

7. Do pharmacists routinely recommend any of the following non-pharmacological advice? (mark all that apply)
- Nasal washes
 - Nasal sprays (saline or physiological)
 - Gargles
 - Drinking warm water
 - Steam inhalation
 - Air humidifiers or air purifiers
 - Masks
 - None
 - Other. Please specify: _____
8. What changes would pharmacists like to see in their role in respiratory care? (mark all that apply)
- Increased competence to identify and differentiate respiratory conditions
 - Increased competence to advise patients about the impact of air pollution on their health and how to protect themselves
 - Availability of tools and devices to support a triage role in respiratory health
 - Authority to triage patients
 - Authority to assess symptoms through point-of-care tests
 - Authority to initiate or modify treatment with prescription medicines
 - Authority to order and interpret laboratory tests
 - Other. Please specify: _____
9. After the COVID-19 pandemic, what changes do you expect to see in managing patients with respiratory symptoms in the community pharmacy setting? (open ended)

PART 2: Pharmacists' awareness of the impact of air pollution on respiratory health

10. In your country, how well do pharmacists understand the short- and long-term impacts of air pollution on respiratory health?
- They are well informed about the short and long-term impacts of air pollution on respiratory health
 - They have some knowledge about the short and long-term impacts of air pollution on respiratory health but would require further education and training to fully develop this role
 - This is not an area which pharmacists are knowledgeable about in my country
11. Is the impact of air pollution on health covered by existing respiratory care guidelines for pharmacists in your country?
- Yes
 - No
 - Not sure
12. If yes, please indicate the URL when possible:
- _____
13. Do pharmacists in your country proactively discuss and manage the impacts of air pollution on respiratory health with patients or the public?
- Generally, yes
 - Generally, no
 - Sometimes
14. If this is not generally done, what are the main reasons for that? (mark all that apply)
- This is outside the scope of practice of pharmacists
 - Pharmacists do not have sufficient knowledge and need more education to discuss this with patients or the public
 - Pharmacists do not have the time to do this
 - Pharmacists are not remunerated to do this
 - Air pollution is not a significant problem in our country
 - Other. Please specify: _____

15. In your opinion, what would help pharmacists in your country feel more confident about discussing the impact of air pollution on respiratory health with patients? (open ended)

16. Please rank the following types of air pollutants in order of priority in your country:
- Industrial pollutants
 - Household pollutants
 - Respiratory viruses
 - Dust from construction or nature
 - Pollens
 - Other. Please specify: _____
17. To what extent do pharmacists in your country understand the protective role of the nose in overall health and how it can be compromised by external aggressors?
- They are well informed
 - They have some knowledge
 - They have little or no knowledge about this subject
18. Do pharmacists recognise a link between air pollution and immune response to viral infections including colds, flu/other influenza-like illnesses and COVID-19?
- Yes
 - No
 - Not sure
 - Other. Please specify: _____

PART 3: Pharmacists’ role in minimising the impact of air pollution on respiratory health

19. What types of advice or recommendations do pharmacists currently provide to patients or the public relative to air pollutant exposure? (mark all that apply)
- They advise people about how to protect themselves from pollen
 - They advise people on how to protect themselves from industrial or vehicle-produced pollutants
 - They advise people on how to protect themselves from household and other indoor pollutants
 - They advise people about how to protect themselves from severe air pollution events such as wildfires or sandstorms
 - None of the above
 - Other. Please specify: _____

20. How well-equipped are pharmacists to discuss the impact of air pollution on respiratory health with patients and the public?

	Yes	No
<input type="radio"/> They have the necessary tools (information material, point-of-care tests, devices) to support their role in advising the public and patients about the impact of air pollution on respiratory health		
<input type="radio"/> They have the appropriate incentives to perform this role		
<input type="radio"/> They have the regulatory authority to perform this role		
<input type="radio"/> Other. Please specify: _____		

21. Do pharmacists in your country commonly screen patients to assess the impact of air pollution on their respiratory health?
- Yes
 - No

22. To what extent do pharmacists in your country recommend nasal washing as a method to remove particles such as air pollutants from the nose?
- They don't recommend nasal washing
 - They sometimes recommend nasal washing
 - They often recommend nasal washing
23. What simple decision-making tools or devices would help pharmacists in your country identify patients at risk from air pollution?
- Rapid blood test strips (e.g. like glucose test strips) to identify patient's risk/susceptibility to oxidative stress damage
 - Rapid swab tests for markers of nasal inflammation/irritation following pollution exposure
 - Smart peak flow meters
 - Electronic diary/app and/or strips to measure exposure to pollutant (ozone/NO₂) combined with one of the above
 - Live local air pollution risk level information
 - Short form patient questionnaire (combined with one of the above)
 - Nasal pH test for pollution exposure — either pH strip or hygienic tissue with integrated pH spot
 - Other. Please specify: _____
24. In your opinion, which of the following factors would most motivate pharmacists in your country to play a more active role in minimising the impact of air pollution on respiratory health? Please rank the following factors.
- Adequate remuneration
 - Having more time
 - Having more workforce capacity (more personnel)
 - Improved patient perceptions and awareness of this role
 - Appropriate diagnostic or educational tools
 - Other. Please specify: _____
25. Would you agree with the statement that pharmacists want to evolve their role as trusted advisors and provide added value to patients through education and proactive care in the area of respiratory health and air pollution?
- Yes
 - No

Appendix 2. Expected changes in the management of patients with respiratory symptoms in the community pharmacy setting after the COVID-19 pandemic — detailed answers per country (n=41)

Country	Response
Argentina	Pharmacy as an essential service during the COVID-19 pandemic has positioned itself as a space of easy and direct access to professional consultations by telephone or physically at the pharmacy, and the expected change is the recognition by the health authorities of the role of pharmacists.
Armenia	Increased competence to identify and differentiate respiratory conditions
Australia	This is difficult to forecast. It is likely that current roles will continue. However, panic purchasing of salbutamol inhalers without a prescription during the COVID-19 crisis phase, and associated supply limits/restrictions that the Pharmaceutical Society of Australia worked with the Government to impose, has identified a large cohort of patients with poorly controlled respiratory symptoms reliant on salbutamol MDI to control this. It is likely that these restrictions will be maintained, with increased focus on rational use of respiratory medicines.
Belgium	More difficulty explaining proper use of inhalation devices, as this requires close contact and manipulation of a dummy device.
Bosnia and Herzegovina	Pharmacies around the world have been on the front line in terms of health care. The role of pharmacists in the care of patients with respiratory diseases should be more significant in the health care system.
Brazil	Case tracking, care of mild cases and referral of severe cases. We have prepared a risk stratification matrix to guide these processes
Bulgaria	Changes in the law for more authority for pharmacists to work with patients. Diagnosis and change of medication, follow-up of the patient's disease. Unified guidelines.
Cameroon	Technique for differentiating the symptoms of COVID-19 from other respiratory diseases.
Canada	Increased scope of practice for pharmacists to triage patients via point-of-care tests.
Cape Verde	We hope that we can be better prepared technically and scientifically to identify and diagnose respiratory diseases, give appropriate advice and referral to the appropriate specialist if necessary.
Colombia	Improving primary care by pharmacists.
Costa Rica	Introduction of protocols for action and greater empowerment of pharmacists in the care of respiratory diseases.
Cyprus	Vaccination by pharmacists might be considered to be authorised.
Denmark	Community pharmacies will be part of the national vaccination programme for pneumococcal disease.
Fiji	Greater awareness among the community in relation to communicable respiratory illnesses.
Finland	People are advised more and more to call ahead to a primary care service or pharmacy to get some advice rather than visit in the first instance. Remote services will become more sought after. So it could be important for facilities to share the same triage protocols as it makes no difference whether it is a nurse in a hospital or a pharmacist in a community pharmacy that is answering the phone

Country	Response
France	Reinforcement of the pharmacist's role in the prevention of respiratory diseases (extended authorisation to prepare hydro-alcoholic solutions and availability of masks to be delivered to fragile patients); continued authorisation for renewal of chronic treatments by the pharmacist; enlargement of the list of rapid diagnostic aid tests that can be used by dispensing pharmacists; and protocols for dispensing of medicines normally available on prescription.
Ghana	Capacity built for managing patients with respiratory symptoms and service provision in the community pharmacy setting with this specialty, e.g., Certified Respiratory Management Specialist.
Hong Kong, China	People are more concerned with infection so they wear masks, and this leads to a decrease in other respiratory symptoms.
Hungary	There are no planned changes.
Iceland	Hopefully there will be more official understanding of the capabilities of pharmacists to have an active role in care of patients with respiratory diseases.
India	Pharmacist will have to check if symptoms could be COVID-19-related
Ireland	Patients are afraid to visit their GP so pharmacists are increasingly being involved in chronic disease management and monitoring.
Israel	Educate the public to wear masks more often. We have seen a dramatic reduction in influenza
Italy	We expect community pharmacists could increase their competences in identifying and selecting respiratory symptoms in order to give concrete help to their patients and to best collaborate in primary care teams.
Japan	When giving guidance about inhaler use, which used to be conducted on face-to-face basis, strict precautionary measures are needed.
Korea (Rep. of)	None.
Mali	Recommend that the patient put on a mask to isolate him/herself, call the toll-free number or refer to his/her doctor.
Netherlands	Pharmacists will play a role in prevention and early signalling of respiratory symptoms in patients. In order to promote a reliable up-to-date medication overview, it is recommended that the patient with a COVID-Associated Lung Disorder(CALD) have a permanent pharmacist who delivers all medication and manages their medication file.
New Zealand	Hopefully, recognition of how helpful we can be in primary health, in vaccinations, in assessing/triaging patients.
Poland	Increased competence to advise patients about the impact of air pollution on their health and how to protect themselves
Portugal	After the COVID-19 pandemic, it would be important for community pharmacies to have more skills in managing the therapy of respiratory patients and more skills in screening non-urgent patients, including the possibility of diagnostic and referral testing, and more skills in prevention.
Romania	Unfortunately, we don't believe that any difference will be made regarding pharmaceutical care after the COVID pandemic. Some changes will be probably made in medical practice. However, our association militates for the Romanian state to formally recognise the pharmacist's role in prevention and to introduce pharmaceutical services in our country. Therefore, we have already addressed these to the Ministry of Health and other institutions.

Country	Response
Rwanda	Authorisation to pharmacists to make rapid tests in pharmacies
Sierra Leone	Community pharmacy point of care testing
South Africa	COVID-19 has trained everyone into basic respiratory symptom management especially for viral infections. I believe the flu seasons will not be as intense going forward as patients are more aware of hand hygiene, social distancing, etc.
Spain	Increased awareness of the most common hygiene measures and nasal washes; increased frequency of mask use during the period in which the coronavirus (COVID-19) coexists with us.
Tanzania	More attention and historical background of patients will be taken before provision of medication.
Turkey	Pharmacists' role in distributing masks to population and dispensing chronic medication is expanded. Pharmacists' role and utility became more visible and we expect that to go on.
Uruguay	Since we have been talking about viruses and how they differ from bacteria for months, I would expect greater awareness that antibiotics are not useful for treating viral diseases.
Yemen	Most COVID-19 patients suffer from some degree of hypoxia, for which oxygen meters are a vital tool. Health authorities should depend on community pharmacists to give primary aid to patients and transfer information about them to the GP. Pharmacist could be a key player in respiratory management based on their skills and training, which also must be specified and documented by the health authority.

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