

Applying a data-driven gender lens to air pollution policies in the ASEAN region

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Key messages

- **Policymakers should take into consideration the ways in which socio-economic and socio-political dimensions mediate air pollution impacts, including the ways social and power inequalities contribute to the conditions in which individuals are made more or less vulnerable to air pollution impacts.**
 - **Gendered social dimensions affect the well-being of people in different ways and can influence an individual's exposure to air pollution and its negative impacts.**
 - **Gender and intersectional dimensions rarely inform the design and implementation of policy responses to air pollution, partly due to lack of disaggregated data, leading to unequal outcomes on different groups.**
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1. Introduction

The 2022 UN Resolution A/RES/76/300 stipulates the human right to a clean, healthy and sustainable environment, including the right to clean air. Yet air pollution is estimated to have caused 6.4 million premature deaths and 93 billion days lived with illness in 2019. Half a million of these deaths occurred in the 10 member states of the Association of Southeast Asian Nations (ASEAN; IHME, 2020). This massive health burden also comes with a high economic cost: the World Bank (2022) estimated that in 2019, the global health cost of mortality and morbidity caused by exposure to air pollution from fine particle pollutants smaller than 2.5 microns in diameter (PM_{2.5}) was USD 8.1 trillion, equivalent to more than 6% of global gross domestic product (GDP), and more than 9% of GDP for east Asia and the Pacific.

The impacts of air pollution are not evenly felt, with individuals' health and well-being affected in different ways. Gender is one component shaping the impacts of air pollution: as a social construct shaped at the societal level and varying across countries, urban and rural divides, cultures and socio-economic status, gender influences where and how individuals spend time, and therefore their exposures to pollution, particularly in relation to work-related activities, leisure time, and household roles and responsibilities (Clougherty, 2010).

A recent scoping review carried out by SEI on existing research on air pollution in the world of work in southeast and east Asia found that the health burden of total air pollution exposure is higher for men than women (Slater et al., 2022), which could reflect higher exposure to air pollutants in workplaces. The same study also found that women and girls were exposed to more household air pollution due to a traditional division of responsibilities. Beyond direct health impacts, the effects of air pollution can also impact women and girls in other ways, such as leading to an increased burden of caring duties for family members affected by air pollution.

In order to ensure effective and equitable policymaking on air pollution, which leaves no one behind, it is important to recognize and understand the unequal distribution of exposure and vulnerability to air pollution across different groups of individuals. In this regard, high quality and timely data disaggregated by gender, income, age, race, ethnicity, migratory status, ability and geographic location, among other characteristics, are vital in identifying those who might be left behind, and thus ensuring that they are included in the decision-making process (UN Women, 2021).

Developing a strategy to take a gendered approach to tackling air pollution is important to facilitate coordination across different parts of government and stakeholders. Existing examples from the ASEAN region of such strategies address climate change, one of the environmental challenges women are often more vulnerable to than others. In particular, poor women are more likely to have limited mobility to avoid weather- or climate-related disasters or to change employment from highly polluting industries, as they have other domestic care duties for which they are often responsible, may have fewer resources, and may play a smaller role in the decision-making process compared to men, both domestically and at larger scales.

The objective of this report is to highlight the opportunities in the ASEAN region for more equitable and inclusive policymaking on air pollution – in terms of developing evidence-based policies through use of gender disaggregated data collection and analysis and in terms of the impacts of their implementation. We highlight here the unequal burdens of air pollution by sharing ASEAN region case studies of approaches that better use and disaggregate data. These case studies demonstrate how policy decisions need to be based on data that highlight the differentiated and gendered health and socio-economic impacts of air pollution and other environmental challenges.

2. Why gender disaggregated data are necessary

Gender equality has been firmly established on the global development agenda since the 1995 Beijing Declaration and Platform for Action, where it was agreed that gender equality is a goal and mainstreaming gender equality is a strategy (Mikkelsen, 2005). The importance of data is well recognized in the global push for more action on gender equality, including as part of resolving inequalities in environmental impacts.

The 66th session of the Commission on the Status of Women in 2022 highlighted the lack of gender disaggregated data as a concern relating to environmental data. Global efforts to tackle environmental health issues, such as the One Health agenda, recognize that data collection still needs to better consider gender inequities and the full potential of women as agents of transformative change (Garner et al., 2022).

Successful gender mainstreaming, as required to achieve Sustainable Development Goal (SDG) 5, requires a data “revolution” including gender disaggregated data, gender analysis, understanding of the political context and involvement of many individuals’ viewpoints in designing programmes and policies (UNSDG, 2019). This has meant more attention and resources allocated to ensuring effective inclusion of women, men and gender minorities, as well as of marginalized groups with regard to socio-economic and other characteristics, in data collection, analyses and decision-making; it also has led to more concerted efforts in systematic and widespread collection and usages of gender disaggregated data on health and environment.

On the global scale, the World Bank Gender Data Portal and the Making Every Woman and Girl Count Programme (Women Count) led by UN Women are among the key initiatives on gender disaggregated data collection, analyses and disseminations. At the regional scale, across sectors, gender data in ASEAN member states are becoming increasingly available for socio-economic indicators, providing key evidence to inform related decision-making and promote inclusive growth. However, the ASEAN Gender Outlook highlights that gender data for environmental indicators remain poor in the region, thus limiting effective policy responses (Duerto-Valero et al., 2021).

Analysis of existing data in the ASEAN region demonstrates that gender has a significant impact on progress in achieving the SDGs. For example, women living in rural areas and in poor households, of ethnic minorities, with disabilities or with migrant status face systemic discrimination and barriers to education and employment, which limits their potential and hinders their development (ASEAN, 2021). Where other forms of discrimination overlap with gender discrimination – such as discrimination against age or ethnicity – the barriers faced by these groups will increase. Inclusive disaggregated data can give more visibility to the discriminations that these groups face and in doing so, point towards the solutions.

3. Gender disaggregated data for air pollution policy

Recent international agreements and goals make it clear that a timely, effective and gender-sensitive approach to air pollution mitigation is of utmost urgency: the Paris Agreement framed a global transformative path towards a net-zero carbon emissions society, the UN 2022 Resolution stipulated the human right to clean air, and SDGs 3, 7 and 11 target air pollution and SDG5 calls for gender equality by 2030.

Data are an important element of air pollution policymaking, particularly in order to identify the most appropriate mitigation measures and prioritize action to reach those most impacted. Data can be used to identify types and sources of air pollution, and the costs and benefits of different regulations and controls – including on health and other socio-economic costs and benefits.

Policies should be based on a broad and rigorous base of evidence. When quality disaggregated data is lacking or inadequately analysed, regulations or policies may not work or may have unintended consequences on certain population groups and may overlook dimensions of vulnerability and differentiated exposure to air pollution based on gender, age, employment type and socio-economic status, which may in turn result in differing access to healthcare, social and worker protection services, among others.

How gender and other factors are captured by the data (or not) will impact policy design and decision-making, including around the comparison of different available mitigation options. There are opportunities for collecting new data or re-analysing existing data on both the costs and benefits of the differentiated impacts of air pollution and mitigation measures.

Disaggregated data collected and analysed through intersectional gender lens that are compatible across localities (districts, nations and regions) are key to effective policy design, implementation and decision-making, including around the comparison of different available mitigation options. Underpinning responses to air pollution with more gender-responsive data not only can lead to more effective, equitable and inclusive measures, but it can also strengthen broader national and regional gender mainstreaming efforts and keep on track towards gender equity (UN Women, 2020) and therefore all SDGs (UN Women, 2018).

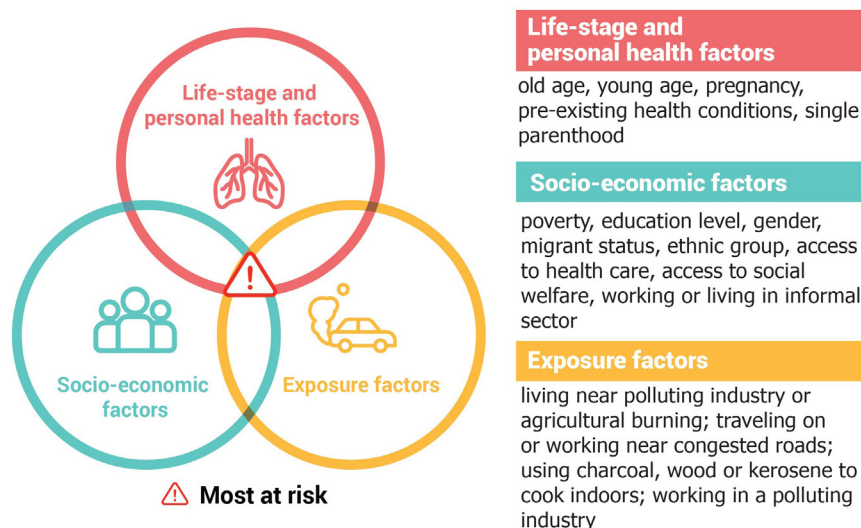
Despite the need for disaggregated data on the socio-economic impacts of environmental problems, they are hard to find. For example, workdays lost due to air pollution-related illness could differ between different groups according to gender, age or other considerations, but the data are lacking to see these differences in the ASEAN region – and this gap in understanding limits policy response. Gender disaggregated data that account for intersecting inequalities will help policymakers and decision-makers to (a) identify the uneven exposure and impact of air pollution felt by different groups; (b) assess the causes and levels of impact; and (c) develop effective mitigation measures and appropriate policy interventions for each group of individuals appropriately.

Better understanding of gender contexts can improve exposure assessments for different groups of individuals (Clougherty & Kubzansky, 2009). As such, gender disaggregated data that are produced or analysed through an intersectional lens can shed light on different levels of exposures and impacts of air pollution on different groups, taking into account the compounding effects of inequalities faced by women and gender minorities, including on the basis of race, socio-economic status, ethnicity, sexual orientation, age and ability, among others.

4. Research gaps on the interaction between air pollution and gender

While recognizing the need for more disaggregated data, there remain gaps in our understanding of the interaction between air pollution, gender and intersectionality (Figure 1). As a result, policymaking cannot adequately address and mitigate for air pollution impacts for all sectors of society.

Figure 1. The interaction between socio-economic characteristics and impacts of air pollution exposure.



Source: Authors' own

A scoping review by Slater et al. (2022) of research papers on air pollution in the world of work in southeast Asia carried out three specific searches of existing literature in the region. The first, a literature search on gender and intersectionality related to air pollution and work, found that research on the impacts of air pollution is framed largely by a medical health and public health perspective, rather than on the lived experiences of exposed groups. Thus, the existing research might assess rates of respiratory illness caused by air pollution, but not how different groups of people can deal with this in terms of their ability to access protective equipment or to take sick leave, or who does care work for sick family members.

Research also remains socio-economically focused on the formal sector (Slater et al., 2022). While data disaggregated by sex is commonly available for socio-economic analysis, such as for health conditions and labour, some areas have data gaps. For example, data from the International Labour Organization on workers in the informal sector rely on labour force or household surveys and so may be less accurate than those conducted in formal employment settings; some countries do not collect any data on informal workers. Therefore, a limitation exists when assessing the health of the labour force, given the lack of both gender analysis and intersectional aspects for informal workers, who lack job security and social safety nets such as sick pay or free or subsidized healthcare and who might face the most challenges if affected by air pollution.

Informal workers often work outdoors, facing long periods of exposure to ambient air pollution, on top of any domestic indoor air pollution. For example, a study of informal vendors of grilled food in Lao PDR found that they spent on average eight hours daily grilling and six days a week selling, putting them in direct exposure to charcoal smoke (Sychareun et al., 2022), generally with no recourse to sick leave.

Studies of workers' exposure to air pollution related to gender are frequently biased towards women's presumed (gendered) role as homemakers; this assumption extends to UNEP's 2019 report

on science-based solutions to air pollution in Asia, which only mentions gender in this context. This stereotype or generalization overlooks the way in which gender identity intersects with socio-economic factors that can determine exposure, regardless of gender (Slater et al., 2020).

For example, men are more likely to work in traffic-facing roles such as drivers or traffic police, which involve high pollution exposure, on top of pre-existing exposure to ambient and domestic air pollution. Men in Southeast Asia suffer more years of life lost due to occupational exposures to particulate matter, gases and fumes (Slater et al., 2022). These findings indicate that men, depending on occupational type, are equally, if not more, susceptible to air pollution impacts than women facing domestic exposure – yet this perspective is not well captured in existing literature on gender and air pollution. A study by Wang et al. (2017) touches on this theme, pointing out that men are unequally exposed to air pollution due to differences in labour composition in various occupations.

Slater et al.'s (2022) second scoping review of research covering health impacts and occupational air pollution exposure in southeast Asia found that while most of the papers did study occupational exposure to air pollution for both men and women, only two studies explicitly mentioned the different genders' vulnerability. One study had too few women police officers compared to men in the study group of exposure to PM_{2.5}, therefore making it difficult to draw firm conclusions (Huang et al., 2012). Where gender differences are found, researchers attribute them to physical features or socio-cultural norms. For example, in Thailand a study found women street vendors had higher cancer risk than men street vendors, correlated to the women's significantly lower body weight (Tunsaringkarn et al., 2014).

Hierarchies within a sector or workplace influenced by gender, social class and other factors also result in unequal exposures to air pollution, with lowest-skilled workers usually the most exposed. Slater et al.'s (2022) third literature review focused on research on the health impacts of workplace air pollution in the region; it found that health impacts are strongly mediated by social axes of stratification such as class, job roles, gender, age and place of residence. For example, air pollution disproportionately affects sectors with a majority of male and lower-educated workers (e.g. energy-related industries) and will have the least impact on sectors with a higher representation of female and higher-educated workers (e.g. the public administration sector; Wang et al., 2017). This finding underscores the intersectional nature of air pollution impacts: while gender can be a key factor in determining air pollution exposure among workers based on the gendered composition of different sectors, education levels – and by extension, social class and status – intersect with gender in determining exposure levels; thus it is not sufficient to consider gender on its own.

Research approaches to studying these impacts can also be framed by gendered stereotypes. For example, much of the research on household air pollution focuses on women's domestic duties and exposure to cookstove air pollution. As indoor fossil fuel burning for cooking increases kitchen PM_{2.5} concentrations (Clougherty, 2010), women, who are generally tasked with household cooking, tend to be more at risk of suffering from respiratory-related symptoms and diseases as a result of the household exposure (Behera, 1997; Behera & Balamugesh, 2005; Verma & Imelda, 2019). Mengersen et al. (2011) confirmed the role of indoor air pollution on women and children's health in Lao PDR, concluding that various symptoms of respiratory illness in women and young children aged 1–4 years were positively related to indoor exposures to activities such as cooking, dusting and drying clothes inside. Accordingly, based on the large-scale government-led clean energy access in Indonesia, Verma & Imelda (2019) showed switching to clean energy, in this case from kerosene to liquified petroleum gas, significantly improved the health, productivity and economic opportunities for women. However, this domestic focus on women neglects to consider that many men bear a double burden of air pollution exposure – household exposure from indoor cooking, on top of workplace exposure that can be high.

The challenge of gender stereotypes framing research in different contexts are perpetuated, for example through policy decisions. Where there is research on occupational exposure impacts on women, the emphasis is on impacts on reproductive health, which creates the risk of overlooking respiratory and other health and non-health impacts. Beyond gender, the Slater et al (2022)

review demonstrates that there is still limited air pollution research in Asia that looks at other intersectional factors – factors such as race, ethnicity, migrant status, informality, being in a gender minority, and age all can determine not only exposure to air pollution at home and in the workplace, but also the consequent health impacts and access to healthcare (Figure 2).

Figure 2. Research gaps on unequal impacts



Source: Authors' own

5. Case studies with examples of good practice

In light of the above discussion on the importance of good data and continued gaps in knowledge, the following case studies from ASEAN countries highlight the role that data can play to improve our understanding of gendered impacts of air pollution in the contexts of production, national assessments and policymaking.

5.1. Viet Nam's handicraft workers

Gaining a nuanced understanding of air pollution exposure of different workers, even within the same industry, requires a thorough approach and engagement of affected stakeholders. Data collected in a research study of handicraft villages in Viet Nam found that pre-existing inequalities related to gender, age and other socio-economic and cultural factors (e.g. income, migration status, gender norms, employee status) meant that workers were exposed to air pollution as an occupational hazard (Thi Thanh et al., 2022). Men, especially younger men, tended to participate more in hazardous tasks, while earning higher wages in general. Women tended to earn lower wages in production facilities because their assigned work is perceived as less physically demanding. However, due to the nature of the tasks, women were largely confined within production facilities, unlike men who might be making deliveries, and therefore spent more time being exposed to concentrated air pollution indoors (Thi Thanh et al., 2022).

These data show that handicraft villages require specific occupational safety and health guidelines, as existing policies and regulations from the state and local governments are insufficient in accounting for the differentiated impacts of air pollution on workers. Workers need legal support systems, due to the fact that they are often informally employed in family-run businesses, where mechanisms to protect worker rights are limited. Using this data, tailored guidelines for craft villages can be developed and enforced with the support of local organizations such as women's and youth unions.

5.2. Gender disaggregated data in air pollution health impact assessments

Air pollution impacts different groups separately, due to both differential levels of exposure as well as to underlying differences in health. For national-scale ambient air pollution health impact assessments, it can be difficult to find data on the differential levels of ambient air pollution exposure for different groups; therefore, exposure to ambient air pollution is often assumed to be the same for all groups in one location.

However, ambient air pollution health impact assessments often use available gender and age disaggregated baseline mortality rate data to quantify the health burden of air pollution separately for males and females, as well as for other vulnerable groups, such as infants and the elderly, assuming the same level of exposure. Both Thailand and Cambodia recently developed integrated air pollution and climate change mitigation assessments that directly use this data to quantify the impact of air pollution exposure for different groups (Ministry of Environment, Royal Government of Cambodia, 2021; Rungsiyanom et al., forthcoming). Using these data in such assessments can highlight which groups are the most vulnerable to air pollution and help to understand how differential policies could benefit members of society.

According to the recent World Bank study on access to clean cooking operations (ESMAP, 2022), the negative health impacts from household air pollution (HAP) associated with smoke emissions from traditional cookstoves are well established, particularly for women and children. In household air pollution health impact assessments, these differential exposure levels are taken into account and can feed into the development of countries' household energy strategies. For example, within Thailand's Health and Pollution Assessment and Prioritization Program (Pure Earth, 2019), the high health burden faced by women from household air pollution exposure is directly identified as a key issue that needs to be understood and addressed in the development of future policies.

5.3. Better modelling incorporating gendered impacts

Policymakers increasingly use modelling of the impacts of air pollution to develop new measures and policies. Having and utilizing gender disaggregated data to model scenarios to inform decisions can allow for more targeted policies and strategies that explicitly take gender and vulnerability into consideration.

The Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) is one such model, developed by the International Institute of Applied Systems Analysis (IIASA), which directly quantifies the health impacts, costs, and some co-benefits (such as for climate change) from policies that target major sources of air pollution. The GAINS model has been applied to the ASEAN region to identify specific additional policies and measures, which, if implemented, could result in 160 000 avoided premature deaths in the region annually compared to implementing current policies only, due to reduced ambient air pollution (ASEAN Solutions Report). The GAINS model has also been applied in a cost of inaction assessment for air pollution in three ASEAN member countries (Cambodia, Thailand, and Indonesia), and here it can directly quantify not only the health impacts (including several mortality and morbidity indicators) but also the economic costs of exposure to air pollution for each country (Kiesewetter et al., 2023, forthcoming, a,b).

The aim of developing such assessments is typically to increase the evidence base for policy development. As highlighted above, considering issues of gender and vulnerability within these types of assessments can allow for a better understanding of who is most exposed to air pollution and who will be the most impacted by policies which aim to reduce exposure.

In terms of understanding the gendered impacts of air pollution exposure, there are several ways in which the GAINS analysis for the ASEAN region could be enhanced. The GAINS model does not currently disaggregate the health impacts from ambient air pollution exposure by gender. As with

most integrated assessment models, GAINS assumes the same exposure to ambient PM_{2.5} for all individuals in a population in question based on air pollution concentrations, due to the lack of available data on how different groups of a population are exposed to air pollution. However, gender disaggregated data is readily available for various health endpoints related to air pollution exposure (in particular, cause specific mortality) and could be used to extend the GAINS analysis to understand the different impacts that a certain level of air pollution exposure has on different groups.

Furthermore, the health impacts of household air pollution exposure, which are known to predominantly impact women and children, are not yet quantified directly within the GAINS model. This source of exposure is particularly important in lower- or middle-income countries where a large proportion of the population still cooks with traditional stoves, and where women and children spend the most time indoors in the household. Including the health impacts of household air pollution within future analyses would therefore likely increase the current estimates of the health burden of total air pollution exposure, particularly for women in the ASEAN region. It would also allow for better understanding of the ways in which policies relating to “clean cooking technologies” could have health benefits, and to be able to ensure that the development of policies include considerations of gender.

5.4. Highlighting inclusion in developing policies

Civil society can play a key role in analysing data and using it to inform policy decisions. Thailand does not currently have an overarching policy on air pollution control and monitoring, and various draft bills have been drafted and submitted to Parliament for consideration to fill this gap in recent years. The Clean Air Act is one such bill, drafted by the Thailand Clean Air Network (Thailand CAN) using a bottom-up paradigm that focuses on broad civic participation. The draft Act was submitted to Parliament in January 2022 following the collection of over 10 000 citizen signatures as required by law, though it has yet to be debated.

To inform the draft Act, the Thailand CAN developed three white papers, respectively gathering data and analysing it to assess the causes of air pollution, the impacts of air pollution, and possible solutions for Thailand. During the process of drafting the Clean Air Act, Thailand CAN held intensive consultations with stakeholders from government, business and especially civil society. This included specifically consulting with low-income communities in the Four Regions Slum Network and the community women’s and health volunteers’ networks, which is predominantly women-led. Another core stakeholder group is the State Enterprise Workers’ Relations Confederation, representing state workers. The network considered the different groups’ opinions and also ensured the draft was comprehensive and wide-ranging across all stakeholder groups and country regions. The Act drafting process paid special attention to the opinions of vulnerable people, such as pregnant women, the elderly, children, outdoor workers, and others who are more affected by air pollution than other groups. Involving these stakeholders in policy development contributes to building the foundations of participatory democracy and building strong civic politics, which can contribute to ensuring accountability for actions.

5.5. Cambodia Master Plan on Gender and Climate Change

Cambodia has recognized the requirement for a strategy that considers the gendered impacts of climate change to ensure that no group is left behind. Its Master Plan on Gender and Climate Change, published in 2018, provides an overview of the current gaps which exist between men and women in the country and provides guidance about how these can be addressed, including how gender can be mainstreamed into climate change mitigation and adaptation, and other national and local development strategies. Key priority actions from the plan include strengthening institutional capacity and increasing awareness for key agents as well as the implementation of key pilot projects relating in high priority areas such as water, sanitation, and hygiene (WASH). Furthermore, they highlight the requirement for measuring the success of such measures and to include gender indicators within mainstream climate reporting such

as monitoring, reporting and evaluation frameworks. This Master Plan also highlights the value of getting actors from different sectors (environment, planning, gender) to work together for a coordinated approach.

Similar strategies that integrate gender throughout could be put in place or integrated into other plans that focus on air pollution reduction. For example, the Clean and Improved Cooking programme in Cambodia aims to reduce the number of households cooking with traditional biomass cookstoves, which will directly improve the health of women. As part of the programme, the Netherlands Development Organization (SNV) worked closely with the Commune Council for Women and Children in Cambodia to ensure local institutions have enhanced capacity, that women's leadership is recognized, and that women are involved in decision-making processes at all levels. Programmes such as this will not only have a direct health benefit for women through reducing their exposure but will also empower them to have the skills to fight for change and influence policy, demonstrating how gender equality can accelerate progress towards achieving the SDGs.

5.6. Developing specific environment and gender indicators

In response to known gaps in gender disaggregated data in Asia and the Pacific, a “gender-environment indicator set” has been developed by UN Women, the UN Economic and Social Commission for Asia and the Pacific (UNESCAP), the UN Environment Programme and the International Union for Conservation of Nature (Serrao et al., 2019). The report showed that the region currently lacks sufficient data to identify historical trends with regard to mortality rates for household and ambient air pollution (SDG indicator 3.9.1), and sex or age disaggregated data are not available for this.

First proposed with 18 indicators, now the suggested set includes 46 environment–gender indicators, including indicators from the global SDG framework and beyond, pushing for disaggregation by sex for most indicators, but also by other factors such as age, disability where relevant. The indicators address six key thematic areas: land and biodiversity; natural resources, including food, energy and water; climate change and disasters; sustainable consumption, production and waste; health, well-being and sanitation; and environmental decision-making. The proposed indicators include mortality and morbidity rates attributed to environmental causes (unintentional poisoning, air and water quality), by age and sex, similar to SDG indicators 3.9.1, 3.9.2 and 3.9.3.

To better address our understanding of air pollution exposure and vulnerability for policymaking, the indicator set could further require gender disaggregated data on air pollution mortality and morbidity attributed to exposure to domestic, occupational and ambient air pollution, to better direct pollution mitigation measures.

6. Integrating gender into environment and health assessments and action

The cases above have highlighted examples from the ASEAN region where the collection, analysis and use of data has taken a disaggregated approach to enable a more detailed understanding of how different stakeholders are affected by air pollution and how action can be tailored to address this. While gender disaggregated data have becoming more available in recent years, further disaggregation for example by migrant status, ethnicity, educational level and income, remains limited. Concerted efforts and effective coordination may be required at the local, district, national and regional and international levels to develop core indicators and framework for gender-responsive data collection and analysis in order to allow for meaningful comparisons over time and across localities, be they within a country or across countries.

The involvement of key stakeholders such as community representatives and civil society organizations in the design of data collection and collection itself, data analysis and triangulation,

and identification of relevant variables, is key to ensure inclusive data, and they should also be involved in how data is used in informing policies. Therefore, it is important for groups that are typically marginalized or more vulnerable to play a more active role in decision-making, for example policy-drafting committees should include representatives of these groups, and then drafts should go through consultations with focus groups of representatives.

Air pollution is an environmental harm that affects everyone differently, with unequally gendered impacts. Studies suggest that health responses to air pollution differ between women and men and between girls and boys (Clougherty, 2010). These inequalities and differences in exposure and impact experienced by women, men and non-binary people need to be accounted for in air pollution policymaking. Meaningful integration of gender dimensions, particularly from the intersectional approach, in data collection and analyses, could lead to more informed and effective policymaking, particularly on environment and health action that would benefit society as a whole and leave no one behind. As gender implications vary across contexts, designing effective public health policy interventions requires clear understanding about different exposure patterns and corresponding health impact on people of different genders from diverse backgrounds.

Specific ways forward are offered below.

- National Statistical Offices need to incorporate disaggregated categories into their data collection processes, as this remains a concern relating to environmental data as highlighted by the Commission on the Status of Women 66th session. The UN Women model questionnaire, which includes more than 100 indicators on gender and the environment, can be a starting point.
- Planners and researchers carrying out assessments of the costs of inaction on air pollution should integrate a gender and intersectional lens that disaggregates according to sex, age, ethnicity, migrant status and other socio-economic factors, to avoid perpetuating inequalities, as different socio-economic groups are affected by air pollution in different ways.
- Statisticians and researchers analysing data should be aware of potential biases that may arise from the methods of analysis and the preconceptions of the persons or organizations doing the analysis.
- Consultations with different stakeholder groups can greatly help to uncover gaps and biases and unintended consequences, for example in new policies.
- Action should not contribute to social inequalities – instead, key decision-makers should prioritize measures that can offer co-benefits for air pollution and social inequalities, such as green jobs, workplace health and safety, and cleaner fuels.
- Integrated actions led by country governments and supported by multilateral agencies can also link regional and global frameworks on air pollution to gender mainstreaming, such as the ASEAN Gender Mainstreaming Strategic Framework 2021–2025.
- Capacity enhancement of country governments and strengthening collaborations among countries' government agencies are both crucial to effectively improve the collection, analysis and dissemination systems for inclusive data, disaggregated through a gender and intersectionality lens, at the national and sub-national levels, particularly for effective and timely policymaking.
- Optimizing the use, communication and dissemination of disaggregated data, for example through clear data visualization, concise data presentations and engaging narratives by researchers, statisticians, media professionals and policymakers, among others, can reinforce the value and importance of gender-responsive data.
- Enhancing regional and interregional cooperation and partnership in disaggregated gender-responsive data collection and analysis can enable effective monitoring, evaluation and comparison across countries and regions.

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