Editorial
The new WHO Global Air Quality Guidelines: What do they mean for South Africa?

Rebecca M Garland[1,5], Bianca Wernecke[2], Gregor Feig[3,5] and Kristy Langerman[4]

[1]Council for Scientific and Industrial Research, South Africa
[2]South African Medical Research Council, South Africa
[3]South African Environmental Observation Network (SAEON), South Africa
[4]Department of Geography, Environmental Management and Energy Studies, University of Johannesburg, South Africa
[5]Department of Geography, Geoinformatics and Meteorology, University of Pretoria, South Africa

https://doi.org/10.17159/caj/2020/31/2.12915

Ambient air quality standards are a key policy lever in air quality management. In South Africa, the introduction of the National Ambient Air Quality Standards (NAAQS) highlighted the shift in the focus of air quality management from source to receptor that was initiated with the introduction of the NEM:AQA. NAAQS were developed considering health impacts, ambient levels at the time and South Africa's developing economy. There is currently a process starting to review these standards, and this process aligns with the recent release of the new World Health Organization (WHO) Global Air Quality Guidelines (AQG) in September 2021 (World Health Organization, 2021). This is the first update of WHO's AQG since 2005. The WHO's guidelines take into account recent evidence of the effect of air pollution on human health, and many of the guidelines are substantially lower than the previous guidelines (Table 1). In this editorial, we ask what the implications of the new WHO Guidelines are for air quality management and compliance in South Africa.

Overview of new guidelines

The WHO's new guidelines recommend air quality levels for six pollutants based on their health effects, these are: particulate matter with an aerodynamic diameter smaller than 10 µm and 2.5 µm (PM_{10} and $PM_{2.5}$, respectively), ozone (O_3), sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO). In addition to the guideline values, four interim target values are set as "incremental steps in a progressive reduction of air pollution." Interim targets 1-3 are the same as the interim targets

Table 1: *A comparison between the South African National Ambient Air Quality Standards (2009 and 2012) and the WHO Air Quality Guidelines (WHO, 2006, WHO, 2021).*

			South African National Ambient Air Quality Standard		WHO Air Quality Guideline 2005	WHO Interim Targets (IT) and Air Quality Guideline (AQG) 2021				
Pollutant	**Averaging time**	**Unit**	**Current**	**1 Jan 2030**		**IT-1**	**IT-2**	**IT-3**	**IT-4**	**AQG**
$PM_{2.5}$	24 hours[a]	µg/m³	40	25	25	75	50	37.5	25	15
	1 year	µg/m³	20	15	10	35	25	15	10	5
PM_{10}	24 hours[a]	µg/m³	75	n.c.	50	150	100	75	50	45
	1 year	µg/m³	40	n.c.	20	70	50	30	20	15
O_3	8 hours[b]	µg/m³	120	n.c.	100	160	120	-	-	100
	Peak season[c]	µg/m³	-	-	-	100	70	-	-	60
SO_2	24 hours[a]	µg/m³	125	n.c.	20	125	50	-	-	40
NO_2	24 hours[a,d]	µg/m³	-	-	-	120	50	-	-	25
	1 year	µg/m³	40	n.c.	40	40	30	20	-	10

[a] At the 99th percentile i.e. 4 allowed exceedance days per year
[b] At the 99th percentile i.e. 11 allowed exceedance 8-hour periods per year
[c] Average of daily maximum 8-hour mean O_3 concentration in six consecutive months with the highest 6-month running average O_3 concentration.
[d] South Africa has a 1-hr NO_2 standard and not a 24-hour standard
n.c. = no change
- = no value

in the 2005 WHO guidelines, and the fourth interim target is the 2005 air quality guideline (Table 1). The South African NAAQS for $PM_{2.5}$, PM_{10} and O_3 fall between the WHO interim targets 2 and 3, while the South African NAAQS for NO_2 and SO_2 align with the WHO interim target 1.

Effective air quality management needs achievable goals

The new AQGs for PM and NO_2 are substantially lower than previous AQGs. This highlights that there is a risk to health at almost all exposure to these pollutants. We think this emphasizes the seriousness of poor air quality, and thus can be a motivation for focused swift action to improve air quality.

However, it has to be acknowledged that the WHO AQG levels are not attainable in many areas of the world, including many parts of South Africa. This is due in part to the many strong and varied natural sources of pollution (including dust, biomass burning, biogenic and marine sources) in South Africa. The impact of natural sources on air pollution levels is a key research gap. Long term observations in background sites, as initially envisaged in the 2012 Framework for Air Quality Management (RSA, 2012), are important to better understand these sources. Robust modelling experiments to estimate the contribution of natural sources to background levels across South Africa are also a critical piece of the puzzle that must be considered in the review of the NAAQS and setting of standards.

The great difference between the current pollution levels in South Africa and the NAAQS limits on the one hand, and the new WHO AQGs on the other hand, can be disheartening, as these targets may seem unachievable. However, urgent action to reduce air pollution levels is needed, as there are many places in South Africa where the ambient air pollution concentrations do not meet the NAAQS (e.g., Feig et al., 2016; Feig et al., 2019; Govender and Sivakumar, 2019; Hersey et al., 2015; Venter et al., 2012). Any improvement in air quality will have a positive impact on health.

South Africa's NAAQS will continue to be our country's benchmark in air quality management and compliance. The WHO guidelines and interim targets are one of many aspects that need to inform our national standards. Effective air quality management needs achievable goals, and thus, the WHO's interim targets can play an important role in South Africa's standards setting.

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