Comment

Comment on Abdul Jabbar et al. Air Quality, Pollution and Sustainability Trends in South Asia: A Population-Based Study. *Int. J. Environ. Res. Public Health* 2022, 19, 7534

Muhammad Bilal [1] , **Gerrit de Leeuw** [2,3] , **Janet E. Nichol** [4] , **Max P. Bleiweiss** [5] , **Leiku Yang** [1] , **Huabin Chai** [1,*] , **Alaa Mhawish** [6] **and Md. Arfan Ali** [7]

[1] School of Surveying and Land Information Engineering, Henan Polytechnic University, Jiaozuo 454003, China; muhammad.bilal@connect.polyu.hk (M.B.)

[2] Royal Netherlands Meteorological Institute (KNMI), R & D Satellite Observations, 3730 AE De Bilt, The Netherlands

[3] Aerospace Information Research Institute, Chinese Academy of Sciences (AirCAS), Beijing 100045, China

[4] Department of Geography, School of Global Studies, University of Sussex, Brighton BN1 9RH, UK

[5] Department of Entomology, Plant Pathology, and Weed Science, New Mexico State University, Las Cruces, NM 88003, USA

[6] School of Marine Sciences, Nanjing University of Information Science and Technology, Nanjing 210044, China

[7] Center of Excellence for Climate Change Research/Department of Meteorology, King Abdulaziz University, Jeddah 21589, Saudi Arabia

* Correspondence: chaihb@hpu.edu.cn

This comment discusses the use of $PM_{2.5}$ (mass concentration of fine particulate matter with an aerodynamic diameter less than 2.5 microns) data in the recently published article entitled "Air Quality, Pollution and Sustainability Trends in South Asia: A Population-Based Study" by Abdul Jabbar et al. [1]. The authors have used two types of $PM_{2.5}$ data, i.e., $PM_{2.5}$ concentrations and $PM_{2.5}$ exposure data. The source of $PM_{2.5}$ concentration is not explicitly mentioned; however, the article published by Upadhyay et al. [2] is cited in Figure 4. Upadhyay et al. mentioned that $PM_{2.5}$ concentrations were obtained from the ground-based air quality monitoring stations installed at the US embassies in major cities in South Asian countries. These concentrations are limited to specific cities and do not represent country-level air pollution scenarios. The purpose of this comment is not to discuss the $PM_{2.5}$ concentrations provided by the US embassies, but instead to comment on the use of the $PM_{2.5}$ exposure data, which are used in Abdul Jabbar et al.'s paper. These exposure data are obtained from the World Bank database (https://databank.worldbank. org/source/world-development-indicators (accessed on 17 October 2022)). $PM_{2.5}$ exposure (EXP) is related to $PM_{2.5}$ concentrations through $Exp = SUM\{(Pi/P) \times Ci\}$, where Ci = annual mean PM_{10} or $PM_{2.5}$ concentration in sub-population Pi, $P = SUM (Pi)$, which is the total population in cities with data [3].

It is well established that both $PM_{2.5}$ concentrations [4] and $PM_{2.5}$ exposure [5] significantly increased in Pakistan during the last few decades. However, the $PM_{2.5}$ exposure data reported by Abdul Jabbar et al. [1] do not show substantial variation between 1990 and 2017, and they state that the mean exposure to $PM_{2.5}$ in Pakistan over the period was "steady". We illustrate the discrepancy in Figure 1, which plots the time series of $PM_{2.5}$ exposure data (2010–2017) obtained from the World Bank database (which are used by Abdul Jabbar et al. [1]) and $PM_{2.5}$ concentrations obtained from both the Copernicus Atmosphere Monitoring Service (CAMS) reanalysis data (2010–2017) and the World Health Organization (WHO) website (https://www.who.int/data/gho/data/themes/air-pollution/who-air-quality-database, accessed on 17 October 2022) (2010–2016).
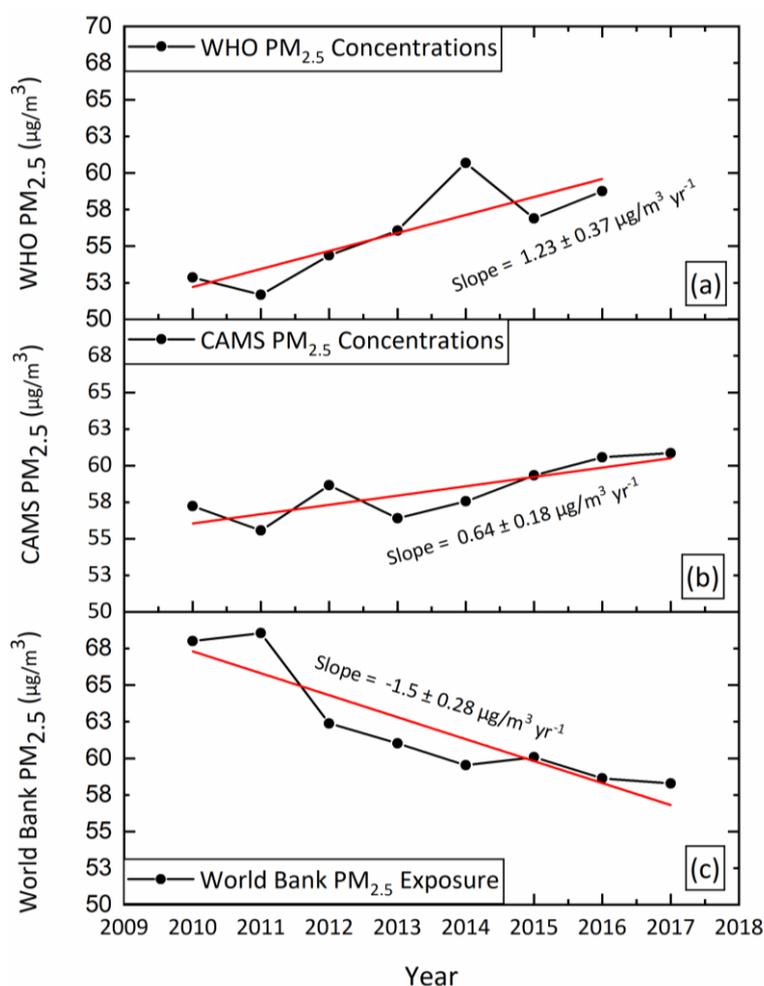
Figure 1. Time series of PM$_{2.5}$ concentrations obtained from (**a**) the WHO database (2010–2016) and (**b**) CAMS reanalysis data (2010–2017). (**c**) PM$_{2.5}$ exposure was obtained from the World Bank database (2010–2017). PM$_{2.5}$ concentrations from the WHO website were not available for 2017.

Pakistan is the second-most polluted country among South Asian countries, as reported by the authors [1]. Therefore, reliable and accurate information is required for policymakers and research scientists to mitigate air pollution problems in Pakistan. Thus, further investigation is required to resolve discrepancies between PM$_{2.5}$ exposure and concentration data from different sources before they can be used in any scientific research or policy application.

Int. J. Environ. Res. Public Health **2023**, 20, 5075

3 of 3

References

1. Abdul Jabbar, S.; Tul Qadar, L.; Ghafoor, S.; Rasheed, L.; Sarfraz, Z.; Sarfraz, A.; Sarfraz, M.; Felix, M.; Cherrez-Ojeda, I. Air Quality, Pollution and Sustainability Trends in South Asia: A Population-Based Study. *Int. J. Environ. Res. Public Health* **2022**, *19*, 7534. [CrossRef] [PubMed]
2. Upadhyay, A.; Mahapatra, P.S.; Singh, P.K.; Dahal, S.; Pokhrel, S.; Bhujel, A.; Joshi, I.B.; Paudel, S.P.; Puppal, S.P.; Adhikary, B. Learnings from COVID-19 Forced Lockdown on Regional Air Quality and Mitigation Potential for South Asia. *Aerosol Air Qual. Res.* **2022**, *22*, 210376. [CrossRef]
3. Environment and Health Information System (ENHIS): Population Weighted Annual Mean $PM_{2.5}$ in Cities. Available online: https://gateway.euro.who.int/en/indicators/enhis_26-population-weighted-annual-mean-pm25-in-cities/ (accessed on 5 November 2022).
4. Bilal, M.; Mhawish, A.; Nichol, J.E.; Qiu, Z.; Nazeer, M.; Ali, M.A.; de Leeuw, G.; Levy, R.C.; Wang, Y.; Chen, Y.; et al. Air pollution scenario over Pakistan: Characterization and ranking of extremely polluted cities using long-term concentrations of aerosols and trace gases. *Remote Sens. Environ.* **2021**, *264*, 112617. [CrossRef]
5. Brauer, M.; Freedman, G.; Frostad, J.; van Donkelaar, A.; Martin, R.V.; Dentener, F.; van Dingenen, R.; Estep, K.; Amini, H.; Apte, J.S.; et al. Ambient Air Pollution Exposure Estimation for the Global Burden of Disease 2013. *Environ. Sci. Technol.* **2016**, *50*, 79–88. [CrossRef] [PubMed]