

dr. Pandu Tridana Sakti Sp.PD

Mataram, 1 September 1993

Internist at Royal Progress Hospital, Sunter (Monday-Saturday 17.00-21.00)

Educational Background :

Internal Medicine Specialist, Brawijaya University

International Congress :

- World Congress of Nephrology, Canada, 2021
- Asia-Pacific League of Associations For Rheumatology Congress, Hong Kong, 2022 Scientific Publications :
- Intercontinental Cooperative Non-Hodgkin T-Cell Lymphoma Prospective Registry Study in Asia: ICT Study. Samsung Medical Center (2018).
- Five-Year Survival Rate of Patients with End-Stage Renal Disease on CAPD at Malang CAPD Center, Indonesia. Acta Medica Indonesiana Journal (2023).
- Effects of Candesartan-Losartan on Inhibiting Mesangial Expansion in Diabetic Rats Receiving Rosmarinic Acid. Nephrology Dialysis Transplantation Journal (2023).
- Delayed Diagnosis of Takayasu Arteritis as an Etiology of Reccurent Ischemic Stroke Attack. International Journal of Rheumatic Diseases (2023).
- Case Series of Delayed Diagnosis Adult Onset Still's Disease: Diagnostic Dilemma in Positive ANA and TB Areas. Modern Rheumatology Case Reports (2023).
- Risk Factor Analysis for GERD in COVID-19 Pandemic Era on Resident Physicians of Faculty Medicine Brawijaya University. Jurnal Penyakit Dalam Indonesia (2022)
- Five Years Survival Rate of CAPD in ESRD in Indonesia: Can CAPD be A Solution for ESRD in Low Income Country?". Kidney International Report Journal (2021)
- Iron Deficiency Anemia as The Only Manifestation of Colon Cancer in Male Patient. The Indonesian Journal of Gastroenterology, Hepatology (2020)
- Buku Ajar Tuberkulosis Ekstra Paru. FK UI-RSCM (2018).
- Buku Ajar Perioperatif Pada Geriatri, Ismaya Publishing (2023).
- Hak Kekayaan Intelektual "Alur Sistem Rujukan Untuk Pasien Lupus Eritematosus Sistemik (LES) di Malang Raya. Kementerian Hukum dan HAM RI, 2021.







AIR POLLUTION AND HUMAN HEALTH



Health Issues – Air Pollution

Air pollution is responsible for 6.7 million premature deaths every year

89% in low- and middle-income countries The greatest number in South-East Asia and Western Pacific

In Indonesia : BPJS burden for health costs due to Respiratory disease increases significantly



Pollutant

• Particulate matter (PM)

PM is a common indicator for air pollution. Major components : sulfates, nitrates, ammonia, sodium chloride, black carbon, mineral dust and water.

- Carbon monoxide (CO)
 CO is a colourless, odourless and tasteless toxic gas produced by the incomplete combustion of carbonaceous fuels such as wood, petrol, charcoal, natural gas
- Ozone (O₃)
 Ozone at ground level is photochemical smog and it is formed through the reaction with gases and sunlight.
- Nitrogen dioxide (NO₂)
 NO₂ is from the combustion of fuels in the <u>transportation and industrial</u> sectors.
- Sulfur dioxide (SO₂)
 SO₂ is a colourless gas with a sharp odour. It is produced from the burning of <u>fossil fuels</u> (coal and oil) and the smelting of mineral ores that contain sulfur.



PM_{2.5}

- **Particulate Matter (PM**_{2.5}) adalah partikel udara yang berukuran <2.5 μm.
- Pengukuran konsentrasi $PM_{2.5} \rightarrow$ metode penyinaran sinar Beta (Beta Attenuation Monitoring) dengan satuan μ m/m³.







Disease Related PM_{2.5}



LI, Tianyu, et al. A comprehensive understanding of ambient particulate matter and its components on the adverse health effects based from epidemiological and laboratory evidence. *Particle and fibre toxicology*, 2022, 19.1: 67.

Respiratory Problem

YANG, Liyao; LI, Cheng; TANG, Xiaoxiao. The impact of PM2. 5 on the host defense of respiratory system. Frontiers in cell and developmental biology, 2020, 8: 91.

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Cardio-Cerebrovascular Problem

Dirgawati et al. 2019 [132]	The Health in Men Study (HIMS)	Apr 1996- Jan 1999	12,203 participants	≿66years	Perth	5	Fatal: Stroke.	
Hentler et al. 2018 [133]	Swiss National Cohort (SNC)	Dec 2000 Dec 2008	7.28 million observations	>30 years	Switzerland	10	Mortality: AMI (1.034, 95% Ct: 1.014- 1.055).	
Huang et al. 2019	China-PAR	2000-2015	117,575 participants	<50 years >50 years	China	10	Incident: Stroke (13% (1.133, 1.09 to 1.17),	
National Institute NIH-AA	es of Health 2000–20 RP	05 56 part	i5,477 Icipants	5071 years	U.S. states (Califo Florida, Louisiana, Jersey, North Caroli Pennsylvania) and areas (Atlanta, GA Detroit, MI,)	mia, New na, and urban , and	Mortality: IHD (H 10 1.22) and Strok	IR 1.16; 95% CI 1.09– e (HR 1.14; CI 1.02– 1.27).
Ljungman et al. 2019 [136]	Swedish cohorts (includes the Primary Prevention Study (PPS) and the Multinational Monitoring of Trends and Determinants in Cardiovascular Diseases (GOT-MONICA)	Jan 1990- Dec 2011	114,758 individuals	25-64 years	Sweden-Gothenburg, Stockholm, and Umea	1.94	incident: IHD (8.5% (95% GI: -0.5-0.5, 14)).	
Pope et al. 2019 [137]	National Health Interview Surveys (NHIS)	1986-2014	1,599,329 participants	18-84 years	U.S.	10	MortaRy: CP (1.24 (86% CI: 1.20, 1.20)) and (1.23 (95% CI: 1.17, 1.29)).	
Shin et al. 2019 [138]	Ontario Population Health and Environment Cobort (ONPHEC)	Apr 2001- Mar 2015	5.071,956 participants	35-85 years	Canada-Ordario	10	AF: HR (95% Cl): 1.03 (1.01, 1.04) and Incidence: Stroke (HR (95% Cl): 1.05 (1.03, 1.07)).	
Hayes et al. 2020 [139]	National Institutes of Health NIH-AARP	2000-2005	565,477 participanta	50-71 years	U.S. states (California, Florida, Louisiana, New Jersey, North Carolina, and Pennsylvania) and urban areas (Atlanta, GA, and Detroit, MI,)	10	Mortality: IHD (HR 1.16; 95% CI 1.08– 1.22) and Stroke (HR 1.14; CI 1.02– 1.27).	
	Liganor et al. 2019 [132] Heitter et al. 2019 [133] Huang et al. 2019 National Institute NIH-AA Ljungman et al. 2019 [136] Pope et al. 2019 [137] Shin et al. 2019 [138] Hayes et al. 2020 [139]	al. 2019 The Health in Men Study (HIMS) [132] The Health in Men Study (HIMS) Heitlier et al. 2019 Swiss National Cohort (SNC) [133] Huang et al. 2019 China-PAR National Institutes of Health NIH-AARP 2000–20 Ljungman et al. 2019 Swedish cohorts (includes the Primary Prevention Study (PPS) and the Multinational Determinants in Cardiovascular Diseases (GOT-MONICA) Pope et al. 2019 [137] National Health Interview Surveys (NHIS) Shin et al. 2019 [138] Ontario Population Health and Environment Cobort (ONPHEC) Hayes et al. 2020 [139] National Institutes of Health NIH-AARP	Lingunot et al. 2019 The Health in Men Study (HIMS) Apr 1996- Jan 1999 Heittier et al. 2019 Swiss National Cohort (SNC) Dec 2006- Dec 2008 Huang et al. 2019 China-PAR 2000-2015 National Institutes of Health NIH-AARP 2000-2005 56 part Ljungman et al. 2019 Swedish cohorts (includes the Primary Prevention Study (PPS) and the Multinational Determinants in Cardiovascular Diseases (GOT-MONICA) Jan 1990- Dec 2011 Pope et al. 2019 [137] Strivers (NHI5) 1986-2014 Shin et al. 2019 [138] Chinal Health Interview Survers (NHI5) 1986-2014 Hayes et al. 2020 [139] National Institutes of Health NIH-AARP 2000-2005	Lingunited al. 2019 [132]The Health in Men Study (HIMS)Apr 1996- Jan 199912.203 participantsHertlier et al. 2019Swiss National Cohort (BNC)Dec 2008- Dec 20087.28 million cbservationsHuang et al. 2019China-PAR2000-2015117.575 participantsNational Institutes of Health NIH-AARP2000-2005565,477 participantsSwedish cohorts (includes the Primacy Prevention Study (PPS) and the Multinational Determinants in Cardiovascular Diseases (GOT-MONICA)Jan 1980- Dec 2011114.758 individualsPope et al. 2019 [137]National Health Interview Surveys (NHIS)1986-20141,509.329 participantsShin et al. 2019 [138]Ontario Population Health and Contor (ONPHEC)Apr 2001- Mar 20155.071,986 participantsHayes et al. 2020 [139]National Institutes of Health NIH-AARP2000-2005565,477 participants	Linguestation: 1132] The Health in Men Study (HMS) Apr 1996- Jan 1999 12.203 participants ad5years Herither et al. 2019 Swiss National Cohort (SNC) Dec 2006- Dec 2008 7.28 million observations >30 years Huang et al. 2019 China-PAR 2000-2015 117.575 participants <50 years	al. 2019 (132) The Health in Men Study (HIMS) Apr 1986. Jan 1989 12.203 participants abdSyeans Perth Hertifier et al. 2019 (133) Swiss National Cohort (BNC) Dec 2008 7.28 million observations >30 years Switzerland Hung et al. 2019 Switss National Cohort (BNC) Dec 2008 7.28 million observations >30 years Switzerland National Institutes of Health NIH-AARP 20002005 565,477 participants 50-71 years U.S. states (Calific Fiorida, Louisiana, Jersey, North Carolin Pennsylvania) and areas (Attanta, GA Detroit, MI,) Ljungman et al. 2019 [136] Swedish cohorts (includes the Primary Prevention Study (PPS) and the Multinational Determinants in Cardiovascular Diseases (GOT-MONICA) Jan 1980. 114.758 Dec 2011 25-64 years Sweden-Gothersburg, Stochhoim, and Linea 2019 [137] Sweden-Gothers and Determinants in Cardiovascular Diseases (GOT-MONICA) Jan 1980. 114.758 participants 25-64 years U.S. 2019 [138] Chairo Population Health and Environment Cohort (ONPHEC) Apr 2001. 5.071,968 participants 35-85 years Canada-Ortanio Hayes et al, 2020 [138] National institutes of Health NIH-AARP 2000-2005 <	Lingunation The Health in Men Sludy (HIMS) Apr 1996- Jan 1999 12,203 participants ze65years Perth 8 Heitier et al. 2019 Swiss National Cohort (SNC) Dec 2006- Dec 2008 7.26 million coervisions >-30 years Switzerland 10 Huang et al. 2019 China-PAR 2000-2016 117.575 participants <50 years	Image: second

BASITH, Shaherin, et al. The impact of fine particulate matter 2.5 on the cardiovascular system: A review of the invisible killer. Nanomaterials, 2022, 12.15: 2656.

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ESPITIA-PÉREZ, Lyda; JIMÉNEZ-VIDAL, Luisa; ESPITIA-PÉREZ, Pedro. Particulate Matter Exposure: Genomic Instability, Disease, and Cancer Risk. In: Environmental Health-Management and Prevention Practices. IntechOpen, 2019.

• Sun, D., Liu, C., Zhu, Y., Yu, C., Guo, Y., Sun, D., Pang, Y., Pei, P., Du, H., Yang, L. and Chen, Y., 2023. Long-Term Exposure to Fine Particulate Matter and Incidence of Esophageal Cancer: A Prospective Study of 0.5 Million Chinese Adults. Gastroenterology.

Diabetes Risk

Insulin resistance/diabetes

The association between insulin resistance and <u>type 2 diabetes</u> has been reviewed in prior expert reviews 6, 7, 64, 65. In a meta-analysis of cohort studies involving a total of 2,371,907 participants and 21,095 incident cases of type 2 diabetes mellitus, the relative risk for diabetes increased by 39% per 10 μ g/m³ of PM_{2.5} (66). In a recent meta-analysis (13 studies), PM_{2.5} and NO₂ increased the risk of diabetes HR: 1.10; 95% CI: 1.02 to 1.18 and HR: 1.08; 95% CI: 1.00 to 1.17 per 10 μ g/m³ increase in PM_{2.5} and NO₂, respectively)

RAJAGOPALAN, Sanjay; AL-KINDI, Sadeer G.; BROOK, Robert D. Air pollution and cardiovascular disease: JACC state-of-the-art review. *Journal* of the American College of Cardiology, 2018, 72.17: 2054-2070.

Health Prevention

THANK YOU