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Data Article

Data on Indoor Air Quality (IAQ) in kindergartens with different surrounding activities

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ABSTRACT

The aim of the measurement of this data is to evaluate the Indoor Air Quality (IAQ) in terms of chemical and physical parameters. Data were collected at three different kindergartens having different surrounding activities (industrial, institutional, residential area). The chemical parameters measured were respirable suspended particulates of PM_{10}, $PM_{2.5}$, PM_1, carbon monoxide and carbon dioxide, and the concentrations are within the acceptable limit. Physical parameters of wind speed are within the standard, while temperature and relative humidity exceeded the acceptable limit. A strong correlation was found between the chemical IAQ parameters with thermal comfort parameters (temperature and relative humidity). The concentration of IAQ pollutants is higher in order of residential > institutional > industrial.

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Specifications table

Subject area	*Environmental science*
More specific subject area	*Indoor Air Quality*
Type of data	*Table, figure*
How data was acquired	*In-Situ Measurement using Dust TraxTM DRX Aerosol Monitor 8534, Kanomax IAQ Model 2211 and TSI Climomaster Model 9545*
Data format	*Raw, Analysed*
Experimental factors	*The IAQ Parameters involved are Respirable Suspended Particulates (RSP), Carbon Monoxide (CO), Carbon Dioxide (CO_2), Temperature, Relative Humidity and Wind Speed.*
Experimental features	*The IAQ Parameters Measurement were taken based on the Industrial Code of Practice on Indoor Air Quality (ICOP-IAQ)* 2010 by *Malaysian Department of Occupational Safety and Health (DOSH)*
Data source location	*Kuala Nerus, Terengganu, Malaysia (5.3679° N, 103.0472° E)*
Data accessibility	*Data are included in this article*
Related research article	M. Elbayoumi, N. A. Ramli, N. F. F. M. Yusof, A. S. Yahaya, W. A. Madhoun, A. Z. Ul-Saufie, Multivariate methods for indoor PM_{10} and $PM_{2.5}$ modelling in naturally ventilated schools buildings, Atmos. Environ., 94, 2014, 11–21 [1]

Value of the data

- The dataset acquired in this study reveals the variability of indoor pollutants in kindergartens at different surrounding activities of residential, industrial and institutional.
- The evaluated pollutants are compared with standard in determining the IAQ status.
- The dataset will give a deep inside information on the fate of pollutants in indoor environment.
- The information composed in this article can be used as a basis for the health risk assessment on kindergarten children.

1. Data

Table 1 and Fig. 1 show the measured data of IAQ parameters. The measured data are varied between the surrounding activities. High concentration of chemical IAQ pollutants including PM_{10}, $PM_{2.5}$, PM_1, CO and CO_2 was observed at the residential area as compared to the institutional and industrial area. All IAQ parameters are within the acceptable limit of ICOP-IAQ 2010, except for thermal comfort parameters which are relative humidity and temperature.

Table 2 shows the Spearman Correlation Coefficient (r) between IAQ parameters. There exists a strong significant correlation between temperature and relative humidity, RSP and temperature, RSP and relative humidity, CO_2 and temperature, and CO_2 and relative humidity.

2. Experimental design, materials, and methods

The location covers the District of Kuala Nerus, Terengganu. Area selection is determined based on the Terengganu Local Plan [2] as shown in Fig. 2. Three kindergartens were selected based on different

Table 1
Measured data at of IAQ parameters at different surrounding activities (Median±SD).

Parameters	Surrounding activities		
	Industrial	Institutional	Residential
PM_{10} ($\mu g/m^3$)	0.0113 ± 0.0021	0.0120 ± 0.0014	0.0372 ± 0.0024
$PM_{2.5}$ ($\mu g/m^3$)	0.0075 ± 0.0024	0.0090 ± 0.0013	0.0346 ± 0.0021
PM_1 ($\mu g/m^3$)	0.0043 ± 0.0017	0.0070 ± 0.0015	0.0329 ± 0.0021
CO (ppm)	0.1000 ± 0.0000	0.1000 ± 0.0000	0.1000 ± 0.0000
CO_2 (ppm)	539.7500 ± 10.9846	534.2500 ± 16.9076	650.7500 ± 29.0833
Temperature (°C)	30.4250 ± 0.7193	27.4500 ± 0.2881	28.5250 ± 0.4245
Relative Humidity (%)	71.9500 ± 2.6638	89.3500 ± 0.2809	81.9875 ± 1.5555
Wind Speed (m/s)	0.2250 ± 0.0178	0.1700 ± 0.0238	0.2100 ± 0.0217

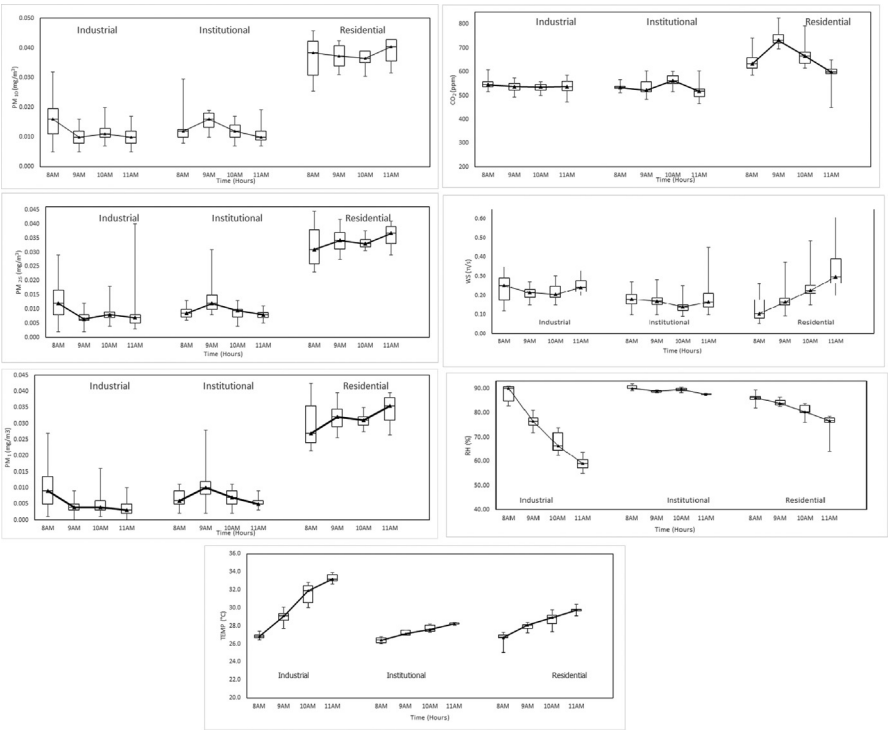

Fig. 1. Variation of IAQ parameters.

Table 2
Spearman correlation coefficient (r) between IAQ parameters.

	Industrial						
Parameter	PM_{10}	$PM_{2.5}$	PM_1	CO_2	T	RH	WS
PM_{10}	1						
$PM_{2.5}$	0.636[b]	1					
PM_1	0.463[b]	0.762[b]	1				
CO_2	0.026	−0.190	−0.222	1			
T	−0.245	−0.385[a]	−0.378[a]	−0.060	1		
RH	0.260	0.347	0.346	0.147	−0.975[b]	1	
WS	−0.035	0.069	0.264	−0.063	−0.378[a]	0.389[a]	1
Institutional							
PM_{10}	1						
$PM_{2.5}$	0.755[b]	1					
PM_1	0.735[b]	0.834[b]	1				
CO_2	0.187	0.174	0.213	1			
T	0.443[a]	0.425[a]	0.505[b]	0.764[b]	1		
RH	−0.307	−0.275	−0.384[a]	−0.606[b]	−0.794[b]	1	
WS	−0.281	−0.206	−0.219	−0.209	−0.403[a]	0.306	1
Residential							
PM_{10}	1						
$PM_{2.5}$	0.216	1					
PM_1	0.106	0.933[b]	1				
CO_2	0.441[a]	−0.479[b]	−0.499[b]	1			
T	−0.563[b]	0.266	0.237	−0.681[b]	1		
RH	0.429[a]	−0.552[b]	−0.514[b]	0.667[b]	−0.716[b]	1	
WS	0.142	0.087	0.066	0.200	−0.016	−0.028	1

[a] Correlation is significant at the 0.05 level (2-tailed).
[b] Correlation is significant at the 0.01 level (2-tailed).

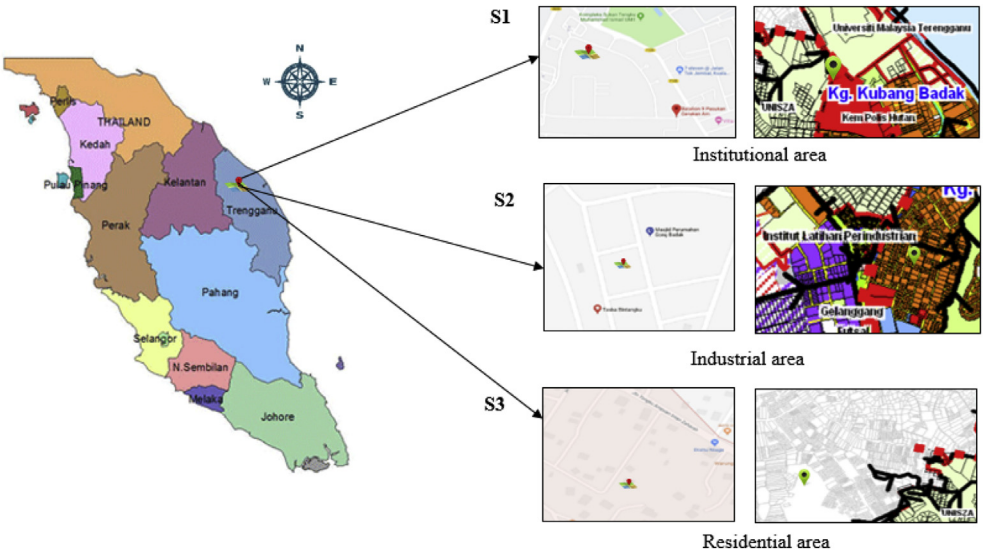

Fig. 2. Sampling location.
(Source: Terengganu Local Plan [2]).

surrounding activities which are institutional, industrial and residential area. The institutional area, TBK PGA 1(S1) is selected which is near the University Malaysia Terengganu (UMT) and University Sultan Zainal Abidin (UniSZA). The industrial area, TBK Perumahan Gong Badak (S2) was selected which is located near the Gong Badak Industrial area and lastly, residential area is represented by TBK Kemas Mutiara (S3). The sampling location together with coordinates and site category are shown in Table 3.

The data were collected for 3 days during school days for all kindergartens. Sampling duration for each kindergarten is 4 hours starting from 0800 hours to 1200 hours. The reading was taken every 1 min and for an interval of 30 minutes. Industrial Code of Practice on Indoor Air Quality (ICOP-IAQ 2010) [3] was used as a guide in running the sampling technique for chemical pollutants; Respirable Particulate Matter (RSP), Carbon Dioxide (CO_2) and Carbon Monoxide (CO). Dust TraxTM DRX Aerosol Monitor 8534 was used to measure the RSP, Kanomax IAQ Model 2211 was used to measure CO and CO2, and TSI Climomaster Model 9545 was used to monitor the relative humidity, temperature and wind speed. The devices were placed at a height between 75 and 120 cm from the floor.

The measured data were then tabulated in Microsoft Excel Spreadsheet 2013. The collected data was first analysed for the normality and homogeneity test. This is important to assess the characteristics of the data, either the data is categorized as parametric or non-parametric. The normality was checked by evaluating the Shapiro-Wilk values and Levene's test values [4]. The distribution of all parameters of chemical contaminants ($p < 0.05$) and physical parameters ($p < 0.05$) is non-Gaussian, thus the median is used as representative instead of the mean. Spearman correlation analysis was applied for the next step of analysing the data. The statistical analysis is deemed for the 95% confidence level [5].

Table 3
Sampling location together with coordinate and site category.

Site	Location	Coordinates	Site category
S1	TBK Kemas PGA	05°24.244″N; 103°05.305″E	Institutional
S2	TBK Kemas Perumahan Gong Badak	05°23.539″N 103°04.830″E	Industrial
S3	TBK Kemas Mutiara	05°24.704″N; 103°04.056″E	Residential

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Transparency document

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2019.103969.

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