

# The influence of children jumping on the bed on PM10/PM2.5/PM1 concentration profile

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## Introduction

Recently, the harmful effects of suspended particulate matter (PM) on human's respiratory system were observed. When children jump on the bed at home, it may resuspend PM. Therefore, the purpose of the present study was to evaluate the influence of children jumping on the bed on PM<sub>10</sub>/PM<sub>2.5</sub>/PM<sub>1</sub> concentration profile at schoolchildren's house.

## Materials and Methods

20 schoolchildren's houses in Kaohsiung city in Taiwan were evaluated. Firstly, PM<sub>10</sub>/PM<sub>2.5</sub>/PM<sub>1</sub> concentration was simultaneously monitored over the first five minutes to obtain background concentration profiles. Then, a common cane was used to tap the bed for about one minute, followed by keeping motionless in 7 to 10 minutes to let PM settle down. Then, we made children's bed by raising bed sheets for about one minute, followed by keeping motionless in 7 to 10 minutes. This evaluation was conducted by the same person for consistency of the beating strength, beating frequency, and beating location.

## Results and Discussion

Our results showed that the concentration of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub> were immediately arising when tapping bed was started, and the peak was kept at least one minute. The mean background concentration of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub> was 89, 80, 80 ug/m<sup>3</sup>, respectively. When tapping bed, the mean concentration of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub> was 1561, 1457, 1456 ug/m<sup>3</sup>, respectively. When making bed, the mean concentration of PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub> was 179, 156, 156 ug/m<sup>3</sup>, respectively. When tapping-bed, PM concentration was 27, 28, and 28 times higher than that of background concentration for PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub>, respectively. When making bed, PM concentration was 2.6, 2.5, and 2.5 times higher than that of background concentration for PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub>, respectively. Mite may be one of the majority components of these resuspended PM.

## Conclusion

In conclusion, jumping on the bed and making bed significantly increased PM concentration. These actions may increase the risk of respiratory symptoms, especially for asthma children.

Table 1. PM concentration of background, tapping and making bed

	PM <sub>1</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>10</sub> -PM <sub>2.5</sub>	PM <sub>2.5</sub> -PM <sub>1</sub>
Background (µg/m <sup>3</sup> )	80	80	89	9	0
Tapping bed (µg/ m <sup>3</sup> )	1456	1457	1561	104	1
Making bed (µg/ m <sup>3</sup> )	156	156	179	22	1
Tapping bed - Background (µg/ m <sup>3</sup> )	1376	1376	1472	95	1
Making bed - Background (µg/ m <sup>3</sup> )	75	76	90	14	0
Tapping bed/Background	18.2	18.1	17.5	12.2	3.3
Making bed/Background	1.9	1.9	2.0	2.6	2.5
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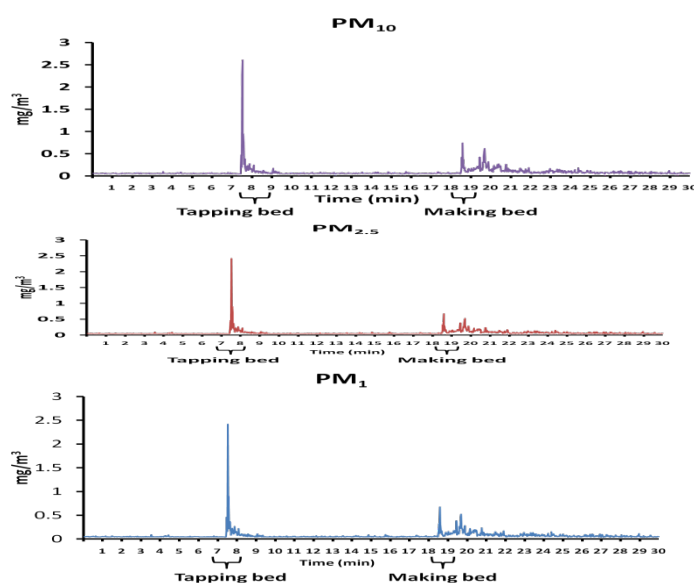


Figure 1. Time serial distribution of PM10, PM2.5, PM1