Smoking outdoors in bars: is it a problem?

An air quality study from Wellington, New Zealand

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Background

In December 2004, legislation was implemented in New Zealand to make all indoor workplaces smokefree, including bars and restaurants.

Smoking was still allowed in outdoor areas, which could be semi-enclosed. The main aim of the smokefree law was to protect staff, customers and the public from exposure to secondhand smoke (SHS).

SHS levels can be assessed by measuring fine particulates such as $PM_{2.5}$.

WHO guidelines for 24-hour mean $PM_{2.5}$ levels are 25 µg/m^3. Studies worldwide have found that in bars and other indoor venues where smoking is allowed, fine particulate levels are very high, typically 200-300 µg/m^3, and in the most polluted bars over 1000 µg/m^3.

A 2006 study of 34 bars in New Zealand found evidence that the smokefree legislation had greatly improved air quality, with a mean PM indoors of 16 µg/m^3 indoors compared with 14 µg/m^3 in the ambient air outside of the venues.

Aims

To test air quality ($PM_{2.5}$) levels in semi-enclosed outdoor smoking areas of bars (pubs) in New Zealand.

To evaluate evidence of drift of fine particles from semi-enclosed outdoor smoking areas to indoor (smokefree) areas.

Methods

Convenience sample of seven bars in Wellington CBD, measured on one to three occasions over four nights, with 12 measurements in total.

All bars had semi-enclosed outdoor areas and one or more communicating entrances leading into the indoor (non-smoking) areas.

We used two TSI AM510 SidePak real time particulate monitors, calibrated to measure $PM_{2.5}$ from SHS (see photograph).

We collected data on Friday or Saturday nights in April, June and August 2007 (winter) and January 2008 (summer) between 7pm and 1am. We measured for about 30-35 minutes in each bar.

On the first two nights we measured simultaneously with one machine in the smoking area and one in an adjacent indoor area. On the second two nights we used the same procedure except that after about 15 minutes the investigators indoors moved further inside the bar as far as practicable from the outdoor smoking area.

We measured smoking rates in the smoking area every five minutes, the degree of communication between the smoking and indoor areas (graded as none/minimal, intermittent, and constant/almost constant) and noted if there was any other sources of particulates.

One bar with a large number of candles and flaming food dishes being served in the indoor area was excluded from the analysis.

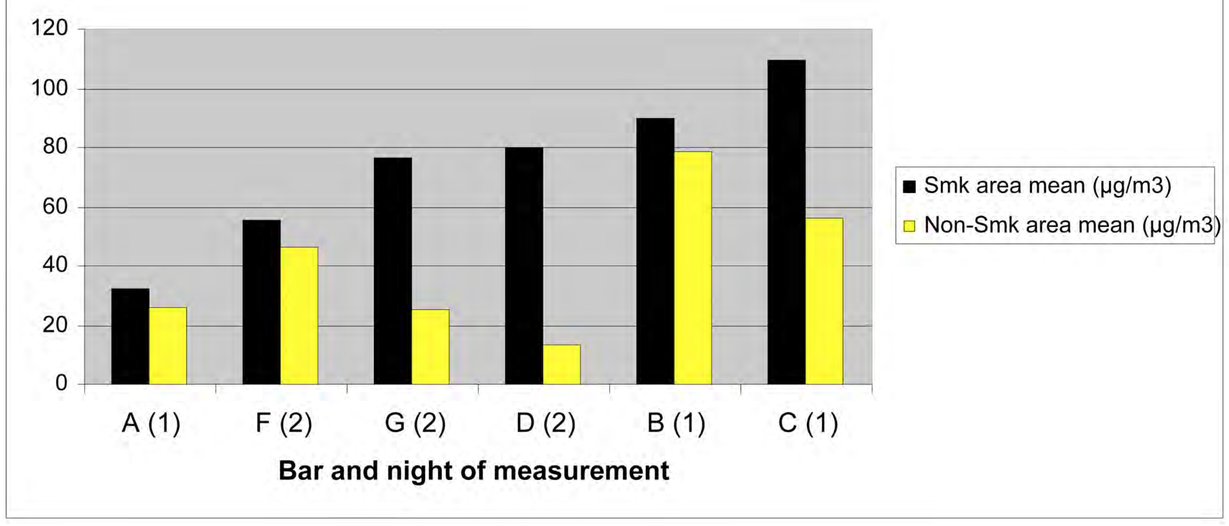
Results

1. First two nights, indoor monitor in fixed position

On the first two (winter) nights, most bars had no or only intermittent communication between the outdoor smoking area and adjacent indoor non-smoking area.

The mean level of $PM_{2.5}$ varied from 32 to 109 µg/m^3 in the smoking area, and from 14 to 79 µg/m^3 in adjacent indoor areas (figure 1). $PM_{2.5}$ levels in the indoor areas were higher in bars where the communicating door(s) was intermittently open (B, C, F), than where it was almost always closed (A, D G).

Figure 1 Particulate levels in outdoor smoking areas and indoor areas, first two nights, indoor monitor in fixed position

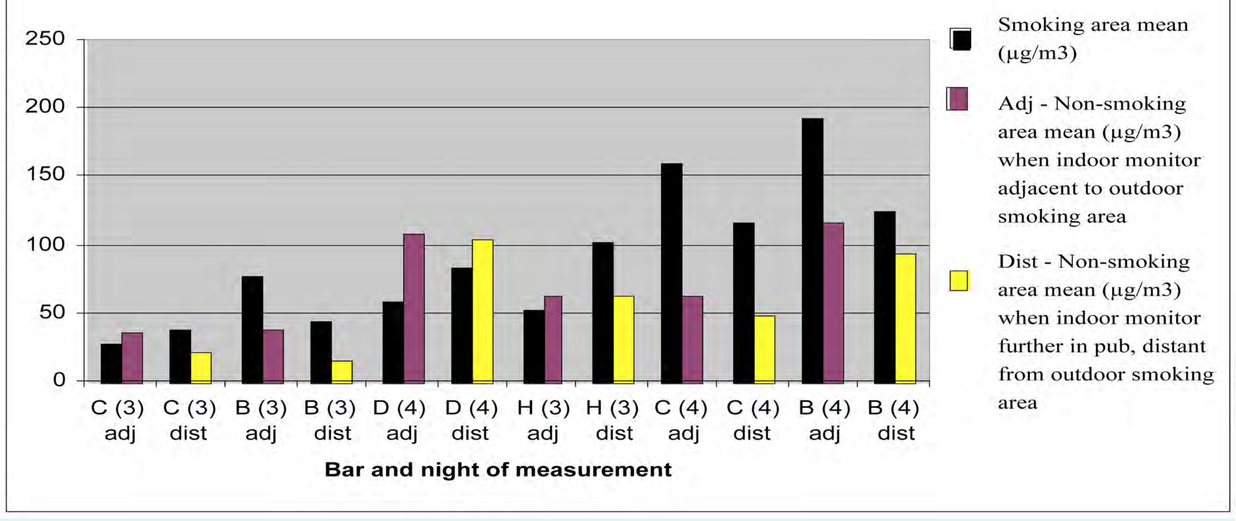


2. Last two nights, indoor monitor in two positions

The second two nights in summer were much warmer. In bar C(3) there was intermittent communication, and in the other five bars constant or very frequent communication between the outdoor smoking area and indoor areas of the bar.

The mean level of $PM_{2.5}$ varied from 29 to 192 µg/m^3 in the smoking areas, from 36 to 117 µg/m^3 in adjacent indoor areas, and from 23 to 104 µg/m3 in more distant indoor areas (figure 2). Candles in the indoor area of bar H may have affected readings.

Figure 2 Particulate levels in outdoor smoking areas of bars and indoor areas of bars, last two nights, indoor monitor in non-fixed position



Higher levels of $PM_{2.5}$ indoors were seen in four out of five bars with free communication between the smoking areas and indoor areas, with levels of around 100 µg/m^3 found in the indoor areas close to and distant from the smoking areas in two of the bars [B(4), D(4)].

Discussion

Air quality in semi-enclosed outdoor smoking areas was very variable, and in some was very poor (see WHO guidelines in *Background*).

Where free communication exists between outdoor smoking areas and indoor areas, SHS drift can greatly reduce indoor air quality throughout the bar.

Regulations to restrict the degree of communication and proximity of smoking areas to indoor areas may be justified to maintain air quality and protect the health of bar staff and patrons.

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References

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