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Original Research

Problems with cigarette smoking and attitudes towards the ban of smoking in Shantou, China

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ABSTRACT

Objectives: To investigate the extent of cigarette smoking, knowledge of health hazards and attitudes towards the ban of smoking in Shantou, China, as causes for failure to control smoking.

Study design: Environmental monitoring and population survey.

Methods: Particulate matter (PM2.5) measurements were conducted in randomly selected public places (restaurants, non-alcoholic drink shops and internet bars) and exposure-related health hazards were evaluated. University students and adult citizens were randomly selected to determine their extent of cigarette smoking, knowledge of health hazards and attitude towards the ban of smoking in public places. The collected data were used to evaluate possible causes and solutions to the smoking problem.

Results: From PM2.5 measurements, the average indoor to outdoor concentrations in non-smoking restaurants were 33.4 vs. 30.6 $\mu g/m^3$, $P > 0.05$; average indoor of smoking restaurants was 350.0% higher, $P < 0.05$; internet bars was 395.7% higher, $P < 0.05$; and non-alcoholic drink shops was 650.2% higher, $P > 0.001$. From our survey of 1100 university students: 1) 17.5% and 7.5% were active male and female smokers, respectively; and 2) 57.5% of students would accept a smoke-ban policy. From 502 adult citizens: 1) 27.5% were active male smokers; 2) Approximately 40 and 60% had inadequate knowledge of health hazards from smoking and second-hand smoke exposure; and 3) >90% of them would accept a smoke-ban policy.

Conclusions: Our data indicate that failure to ban smoking was not caused by resistance from smokers but inadequate (national and local) government effort to educate the public and to enforce existing policy. The data suggest that development of a citizen-based approach, in collaboration with willing officials, may be highly successful in the control of cigarette smoking in China.

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Introduction

With 300 million cigarette smokers in China, smoking-related health effects are among the largest public health problems in the world.[1–3] Indeed, the World Health Organization (WHO) predicted in 2003 that the smoking problem in China would be a 'time-bomb of the 21st century'.[4] Such enormous increase of cigarette smoking in China may have contributed to the slower increase in life expectancy compared to that of some less affluent countries.[5]

Recognizing the severity of its smoking problem, China signed an agreement with WHO in 2003 to reduce smoking.[1] Since then, tobacco control policies after policies have been issued to achieve the goal. The latest one for 2012–2015 also appointed participations from the Ministries of Education, Health, Commerce, Foreign Affairs, Treasury, etc.[6] However, due to the lack of concerted effort for many years, the result has been greatly disappointing.[2,3] This failure may be influenced by the government-owned cigarette manufacturing companies.[7]

Cigarette smoking problem in smaller cities in China is even more serious. For example, Shantou is a mid-sized city of 5.4 million people. It is a designated economic free zone therefore the citizens have medium to above medium level income and it always had a higher rate of smoking than the national average.[3] This may have contributed to the lower life expectancy in Shantou for both males and females compared to that of China and Hong Kong (71.4 years vs. 72.7 years and 81.6 years, respectively).[8]

Most publications have blamed the Central Government of China for failure to control the smoking problem and suggested stronger enforcement as the solution.[9–11] However, we believe that specific local factors can be both the source of and the solution to the problem. Therefore, we have conducted environmental sampling studies to determine the extent of cigarette smoking problems in public places in Shantou. In addition, we surveyed both university students and adult citizens to identify their knowledge about health hazards from smoking and from second-hand exposure to cigarette smoke. Finally, we documented their attitudes towards a ban of smoking in public places.

Methods for the environmental monitoring study

A. PM2.5 measurements

1) Location selection and selection criteria

Restaurants, non-alcoholic drink shops and internet bars were screened for suitability to conduct particulate matter (PM) measurements. [PM2.5 represents particulate matter of aerodynamic diameter < 2.5 m and indoor PM2.5 mainly comes from combustion products such as cigarette smoke.] These businesses were selected within a 5 km radius of Shantou University Medical College. The sites with a lot of customers were identified and then randomly selected for our study. Exclusion criteria for restaurants included open kitchens and cooking at tables. Exclusion criterion for drink shops and internet bars was the presence of smoke-producing activities not related to cigarette smoking.

Besides PM2.5 measurements on sites, a check-list for each site was filled out by our investigators. The list contained the following topics: date and time of visit, name and location of the visited site, number of seats and customers, presence of no-smoking signs, availability of ash-trays and cigarette lighters on tables, number of active smokers, number of cigarette butts, detection of cigarette odor, presence of smoking intervention activities. In addition, dimensions for each site were measured using a remote sensing device.

2) Measurement of PM2.5 concentrations

The PM2.5 equipment (Sidepak AM 510 model, serial number: 11107010; TSI Incorporated, New York, USA) which was routinely used by China CDC was loaned to us for use in this study. For conducting the measurements, our investigator visited the site as a customer during the busy hours and sat at a central location. To avoid detection, the equipment was hidden inside a hand-bag with only a short portion of the transparent tube extending outside of the bag. The bag was set on the table for the duration of the visit.

PM2.5 measurements were conducted six times at each site: the first time at 5 m outside the door, four times inside at 15, 30, 40 and 50 min after arrival, and finally outdoors, 5 min after leaving the site. The duration for each measurement was 10 min. The average of the two outdoor measurements was used to determine the outdoor concentration and that of the four indoor measurements as indoor concentration.

3) Data management and statistical analysis

Normality of the collected PM2.5 data was tested using the K-s goodness-of-fit method of a single sample and the normal distribution data was described by $(\overline{X}\pm S)$. Comparison of the means of two groups was conducted using the *t*-test (normal distribution), the *t*-test (normal distribution and variance not neat) or the Mann–Whitney U test (non-normal distribution). The comparison of the means of multiple sets was conducted using the single factor analysis of variance (normal distribution) or the Kruskal–Wallis *H* tests (non-normal distribution). The comparison of the mean of two groups between multiple sets was performed using the LSD method which is a sensitive analysis for differences between different sets of data. The comparison of paired sample means was conducted using the matching *t*-tests. The counting data was evaluated using adoption rate (# for a specific topic/total #) and the comparison of each group using χ^2 or the Mann–Whitney test.

The Spearman non-parametric correlation and the partial correlation analysis methods were used to analyze the relevance of indoor PM2.5 concentrations with the density of smokers and the number of customers. Multiple linear regression analysis was used to analyze factors that could have influenced the indoor PM2.5 concentrations where the logarithm of the indoor PM2.5 concentrations were used as the dependent variable Y, and the outdoor PM2.5 concentrations, density of smokers and number of customers as the independent variable X.

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