



Tobacco Control Policy

8 January 2005

Tobacco Industry Politics

The Hon Andrew Cheng Kar Fu
Chairman

Tobacco Documents Research

Legislative Panel on Health Services
Legislative Council

Public Health Legislation

Litigation

Dear Mr Cheng

Tobacco Taxation

Proposed Amendments to Smoking (Public Health) Ordinance

Tobacco Induced Disease

We write to offer the general support of this department of public health medicine to the Government's proposals to strengthen the tobacco control ordinance.

Mortality Studies

In view of the large and widespread epidemic of disease caused by both active and passive smoking, these measures should be regarded as a medical emergency in this community.

Maternal and Child Health

We believe that it is very important for honorable members of Legco to recognize that there is a net economic loss to Government and the public sector from the harm caused by tobacco. We shall demonstrate later this year that revenues from tobacco duty are greatly exceeded by the losses due to health care, reduced productivity and loss of life.

Second Hand Smoke and Passive Smoking

Health Care Impact and Econometric Analyses

All workplaces must be smoke-free. In particular it is vitally important that *all* workers in the hospitality industry are fully protected from exposures to second hand smoke. In particular there should be *no exemptions* for any premises, including bath houses and mahjong parlours. This part of the proposal is seriously flawed. There are at least two major reasons for this argument:

Treatment of Tobacco Dependency and Smoking Cessation

First, we have shown that all non-smoking Hong Kong workers in premises which permit smoking have high levels of tobacco breakdown products in their body fluids (Report attached). These highly toxic compounds will predictably damage major organs including blood vessels, the heart, lungs and reproductive system.

Education and Training

As shown by previously concealed research carried out by the Philip Morris tobacco company, second hand smoke (mostly sidestream smoke from the burning tip of a cigarette) is qualitatively different and even more poisonous than mainstream smoke.

Evaluation of Tobacco Control Activities

Second, the risks from second-hand smoke are the same for everyone, *including smokers*. The risks of exposure to second-hand smoke are high for everyone who breathes it.

There are no ethical, commercial or other societal reasons why any group of workers in Hong Kong should be knowingly and deliberately poisoned and exposed to the risks of heart and lung disease, stroke, cancers and, in pregnant mothers, damage to the unborn child.

We urge the Health Services Panel to take a fully evidence-based and public health approach to the prevention of the epidemic of tobacco-induced disease.

Yours sincerely

(signed)

Anthony J Hedley MD
Chair Professor

Sarah M McGhee PhD
Associate Professor

Tobacco Control Research and Policy Unit
Department of Community Medicine
The University of Hong Kong

Encl: Reports (in English and Chinese) on the risks of fatal heart disease and cancer in catering workers exposed to second hand smoke.

Consulting Group:

Professor Anthony J Hedley (Director)
Professor Lam Tai-hing (Head of Department)
Dr Richard Fielding (Head of Behavioural Sciences Group)
Dr Sarah M McGhee
Dr Gabriel M Leung
Dr Wong Chit-ming
Dr Raymond YT Yeung
Dr ASM Abdullah
Ms Winnie WN Ho
Dr Daniel SY Ho

Advisers:

CQ Jiang MD (Guangzhou)
Helen Lapsley BA Mecon (Australia)
Eric LeGresley MSc LLM (Canada)
Judith Mackay MBE MB FRCP FFPH (Hong Kong)
James Repace MSc (United States)
David Scott PhD (Canada)
David Simpson OBE Hon MFPH (United Kingdom)
Professor Alastair Woodward PhD MMedSci MFPH (UK) FAFPHM (New Zealand)
Marcus Yu BA (Hong Kong)

C O S H

香港吸煙與健康委員會

香港飲食業從業員 — 二手煙與心臟病及癌病風險 2001

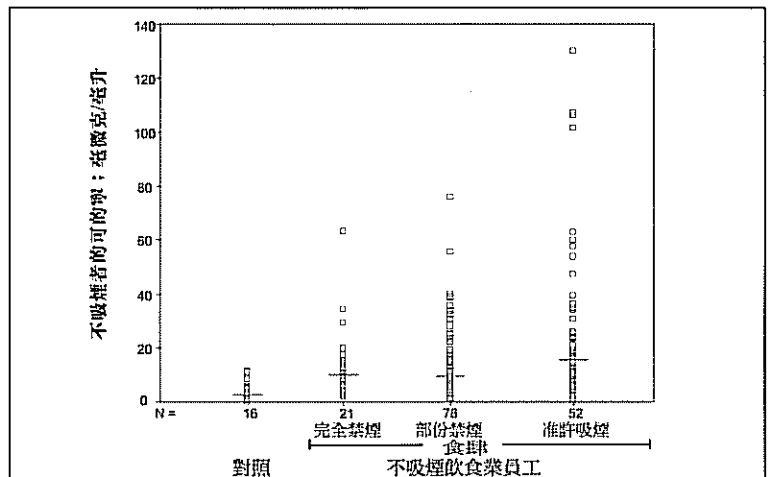
2001年5月

第八號報告書

香港不吸煙飲食業從業員接觸二手煙及被動吸煙 - 患上心臟病及癌病的綜合風險

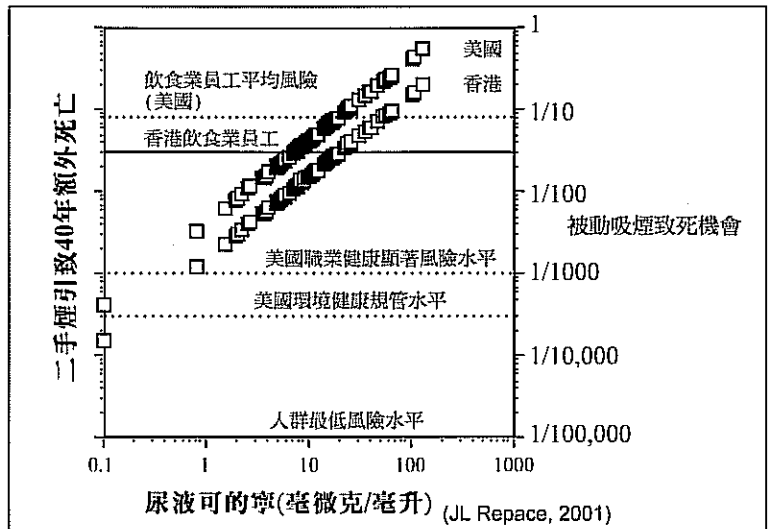
賀達理, 麥潔儀, J Repace, 黃子惠, 余衍深, 陳英偉, 林大慶, 盧志強, 曾文迪, 王麗君, 陳弄年, 吳雪亮, M Janghorbani
香港吸煙與健康委員會, 香港大學社會醫學系, 香港中文大學社區及家庭醫學系, 及美國 Repace Associates Inc, Bowie MD (<http://www.repace.com/>), USA

不吸煙飲食業員工及對照組別人士的尿液可的寧 (Cotinine) 含量



104 位只於工作時接觸二手煙的飲食業員工

根據美國及香港死亡率和香港接觸二手煙情況而評估的工作生命期所承受的心臟病及肺癌綜合風險



1. 背景

二手煙與被動吸煙：被動吸煙是指不吸煙者吸入經由二手煙所污染的空氣，包括由吸煙人士噴出的主流煙及由煙草燃燒而釋出的支流煙。二手煙毒性極強；它含有超過4000種粒狀或氣狀化學物。

健康影響：吸入二手煙為不吸煙者帶來許多健康問題，包括對於眼、鼻、喉部黏膜的極度刺激，慢性呼吸系統疾病如咳嗽、痰多、哮喘及促使哮喘病情惡化。哮喘病患者吸入二手煙後，肺功能隨即下降。被動吸煙亦令血管受損，增加不吸煙者患上心臟病及中風的風險。被動吸煙對孕婦及胎兒的健康造成威脅。兒童對二手煙極度敏感。被動吸煙為兒童帶來許多健康問題，如中耳炎、支氣管毛病、急性胸部感染，並可引致兒童緊急入院。

二手煙含有高濃度一氧化碳，是吸煙人士患上心臟病的一個原因。煙草煙霧亦加速血小板凝聚，引致血液凝固過程出現改變。二手煙中的致癌物質會經吸入人體而進入血液循環系統。接觸二手煙令不吸煙者的血液及尿液增加致癌物質濃度。

美國環境保護處(US Environmental Protection Agency)及英國衛生署煙草及健康科學委員會(SCOTH)同樣接受吸入二手煙會導致肺癌的證據，並將二手煙定為已被證實之致癌物質。

絕無安全界線：就其致癌之可能性而言，二手煙絕無安全指標。當一公共空間受二手煙污染時，任何簡單的分隔吸煙與不吸煙者的措施或通風工程設備皆不能防止被動吸煙。

在1999年，美國熱能、冷藏及空調工程師協會(American Society of Heating, Refrigerating Air-Conditioning Engineers)從ANSI/ASHRAE室內空氣標準中剔除所有有關煙草煙霧可接受的水平的內容。這標準(ANSI/ASHRAE 62-1989)現時清楚指明合理的室內空氣質素標準是基於一個完全不吸煙的環境。

預防二手煙：香港政府及市民大眾日益關注及認識到，香港需要有效措施於所有公眾地方及工作場所預防被動吸煙。現時香港只有少數室內場所能符合有關條件，確保公眾及受僱人士受到保障，免受二手煙影響。

現時食肆禁煙法例中最不足之處，乃是大部份顧客及食肆員未能獲得適當保護。須要超過200個座位的食肆提供三份一座位為「不吸煙」區只是一項象徵性安排，並未能合乎保護市民免接觸二手煙的最低要求，以及公眾衛生目標所要求的全面無煙室內環境。

兩份由香港吸煙與健康委員會於1995年及2000年進行的民意調查均指出，絕大部份市民均希望設有無煙飲食場所，而且如果食肆實行全面禁煙，顧客出外進

食次數亦會增加。換句話說，於飲食場所全面禁煙對業務有利。這兩份調查中受訪的食肆顧客大部份常受二手煙的影響，包括「覺得二手煙霧難聞」、「衣物及頭髮染上煙味」、「眼、鼻、喉部不舒服」、「哮喘或喘鳴」或其他呼吸問題。超過三分之一受訪者對有關食肆更有不良印象，及考慮光顧其他食肆。

另外，亦有兩項本港調查顯示工作間的被動吸煙是引致香港眾多慢性呼吸問題的主要原因之一。本報告以飲食業員工為對象，目的在評估他們於不同工作環境接觸二手煙情況與患上心臟病及癌病的風險。調查初步報告如下。

2. 研究目標

這項試驗研究目的是：

- 紀錄不吸煙飲食業員工於工作間及其他場所接觸二手煙的資料
- 收集及分析尿液中可的寧(cotinine)含量。此為一種尼古丁分解物，並可作為不吸煙者被動吸煙量的指標
- 估計香港飲食業員工的工作生命期之心臟病及肺癌綜合風險

3. 研究對象及方法

研究對象：是次研究總共訪問了184位自願參與的飲食業員工，其中165位提供了接觸二手煙的全部資料。受邀參與條件是基於他們都是不吸煙人士。每人獲得港幣100至150元(包括交通費用)，以示謝意。他們除了完成一份問卷外，還提供50毫升尿液樣本作評估及進行呼氣一氧化碳測試。不吸煙者的呼氣一氧化碳含量通常少於百萬份之10(10 parts per million)。其中14位對象被認為間中或經常吸煙者(或他們自認吸煙者)，而有170人(83位男性及87位女性)為不吸煙者。是次調查中有7位對象被認為經常吸煙者，原因是他們自認、又或是呼氣一氧化碳量偏高(大於百萬份之九百)，而另外7位表示是間中吸煙者，意思是他們每週吸煙少過7支。他們測試的結果亦包括於此報告內，用以和其他組別人士作比較(表1)。大部份(86%)對象受僱於准許吸煙食肆，其餘的來自完全禁止顧客吸煙的食肆(表2)。

是次研究的對照組別有16位人士，他們包括醫生、護理人員或大學研究人員，全部為不吸煙者，於無煙環境工作及避免進入有煙草煙霧的地方。

表 1：於工作場所、家居及休閒活動時接觸二手煙的飲食業員工尿液可的寧含量

研究對象	工作以外的接觸	非顧客吸煙造成的接觸	平均值	人數	標準差	幅度
對照組別	沒有工作以外的接觸	無	3.3	13	3.5	0-11.2
	家居或休閒時接觸	無	5.5	3	4.9	1.1-10.8
	總數	無	3.7	16	3.7	
工作於禁煙食肆之員工	沒有工作以外的接觸	無	6.4	3	6.6	2.6-14.0
		其他員工或於休息時段	14.0	10	17.7	2.2-62.9
		總數	12.3	13	15.9	
	家居或休閒時接觸	無	20.3	5	11.9	3.9-34.1
		其他員工或於休息時段	9.9	3	3.9	5.8-13.6
		總數	16.4	8	10.7	
總數	無	15.1	8	12.0		
	其他員工或於休息時段	13.1	13	15.5		
	總數	13.8	21	14.0		
工作於“部份禁煙”食肆之員工	沒有工作以外的接觸	無	6.1	6	6.4	1.5-18.6
		其他員工或於休息時段	14.3	50	10.8	2.0-55.3
		總數	13.4	56	10.7	
	家居或休閒時接觸	無	7.1	1	7.1	
		其他員工或於休息時段	16.6	21	17.2	1.0-76.4
		總數	16.2	22	17.0	
總數	無	6.3	7	5.8		
	其他員工或於休息時段	14.9	71	13.0		
	總數	14.2	78	12.7		
工作於“准許吸煙”食肆的員工	沒有工作以外的接觸	無	15.9	4	6.5	7.6-23.1
		其他員工或於休息時段	28.7	34	33.9	0-129.4
		總數	27.4	38	32.3	
	家居或休閒時接觸	無	26.5	3	10.5	14.7-34.6
		其他員工或於休息時段	20.0	11	21.9	0.03-62.3
		總數	21.4	14	19.8	
總數	無	20.4	7	9.5		
	其他員工或於休息時段	26.6	45	31.4		
	總數	25.7	52	29.4		
間中吸煙者	沒有工作以外的接觸	其他員工或於休息時段	145.0	6	118.4	2.2-286.8
	家居或休閒時接觸	其他員工或於休息時段	881.4	1		
	總數	其他員工或於休息時段	250.2	7	298.6	
經常吸煙者	沒有工作以外的接觸	其他員工或於休息時段	2996.3	3	1695.0	1281-4671
	家居或休閒時接觸	其他員工或於休息時段	4034.0	4	1274.1	
	總數	其他員工或於休息時段	3589.2	7	1441.2	

表 2：不吸煙員工的數目(%) - 以食肆類別歸類

禁煙食肆		24
快餐店	22	
西式/中式食肆	1	
飯堂	1	
准許吸煙食肆		146
中式酒樓	70 (41.2)	
茶餐廳	31 (18.2)	
快餐店	6 (3.5)	
西式/中式食肆	8 (4.7)	
會所/飯堂/咖啡室	31 (18.2)	
總數		170

可的寧(Cotinine)：當煙草煙霧中的尼古丁進入血液中，經新陳代謝過程分解為其他物質，其中包括可的寧，其含量可於唾液及尿液中量度到。而此等含量亦可作為被動煙民吸入二手煙內有毒物質的指標。所有研究對象及對照組別人士的尿液可的寧含量都經由美國紐約 MetLife 實驗室量度(Dr N Haley)。可的寧值以每毫升尿液中含多少毫微克(nanograms, 10⁹)可的寧計算。

訪問：除了基本統計數據外，員工亦被問及有關在工作間、家居及休憩地方接觸二手煙之情況。在可能情況下，亦記錄於工作間吸煙者的人數及相隔距離。員工過去的吸煙歷史及戒煙多久亦會被記錄。最後受訪

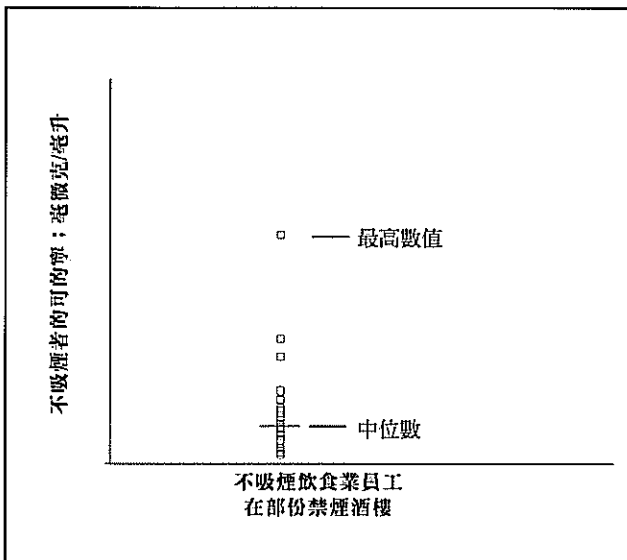
者亦被問及有關呼吸及心血健康問題，包括各類病狀及現時的病徵。

分析： 尿液可的寧含量的分析以主要組別及次組別為單位，而組別則以他們為飲食業員工或對照組別人士身份、他們工作地方類別及於不同渠道接觸煙草煙霧而歸類。

研究對象的歸類最初是以揀選他們之條件為初步劃分基礎(即屬“對照組別”或“飲食業員工”)，又或以他們工作的地方(即屬“禁煙”或“準許吸煙”食肆)分組。

這些結果進而以次組別進行深入分析。次組別包括“非侍應員”(例如會計文員、管房人員、廚師及其他人士)，及“侍應員”(任何提供餐桌服務的侍應員或高級食肆管理人員)。同時亦分析這些員工接觸其他二手煙情況，此等情況包括其他同事吸煙、於工作休息時間、家居及休閒活動時接觸二手煙。

尿液可的寧含量值以 box-whisker 圖表表示，實例如下：



是次香港飲食業員工因接觸二手煙而增加的心臟病及肺癌風險是以 Repace 及其同事發展的藥理動力學風險模式來評估。這模式可用以計算尿液、唾液及血漿中可的寧含量與二手煙民患上肺部及心臟病的關係。這風險以 40 年工作生命期 (WLT₄₀) 計算。運用此模式，Repace 及 Lowrey 曾估計平均每毫升血漿 0.4 毫微克可的寧，可導致因肺癌而死亡比率達千份一。以評估唾液可的寧含量與死亡率關係的模式指出，當唾液可的寧含量由每毫升血漿 0.1 毫微克逐漸升至 1 毫微克，心臟病風險會由三千份一升至百份之一。這風險模式曾為美國癌症學會所進行的一項全面性研究，成功地推算不吸煙者因被動吸煙與患肺癌的關係。

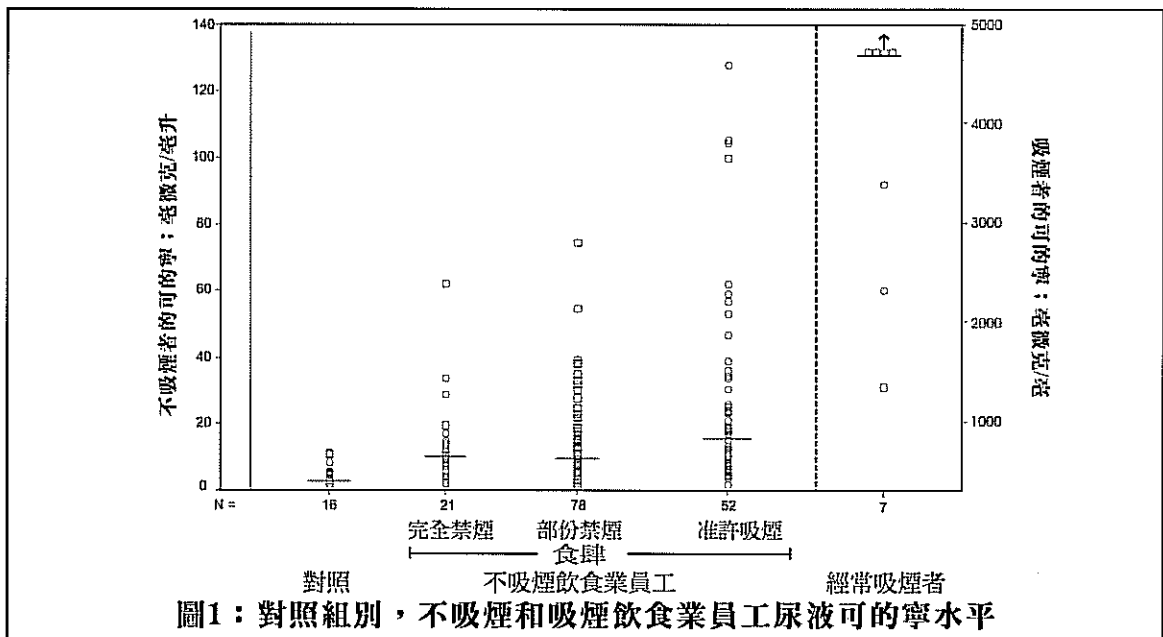
4. 研究結果

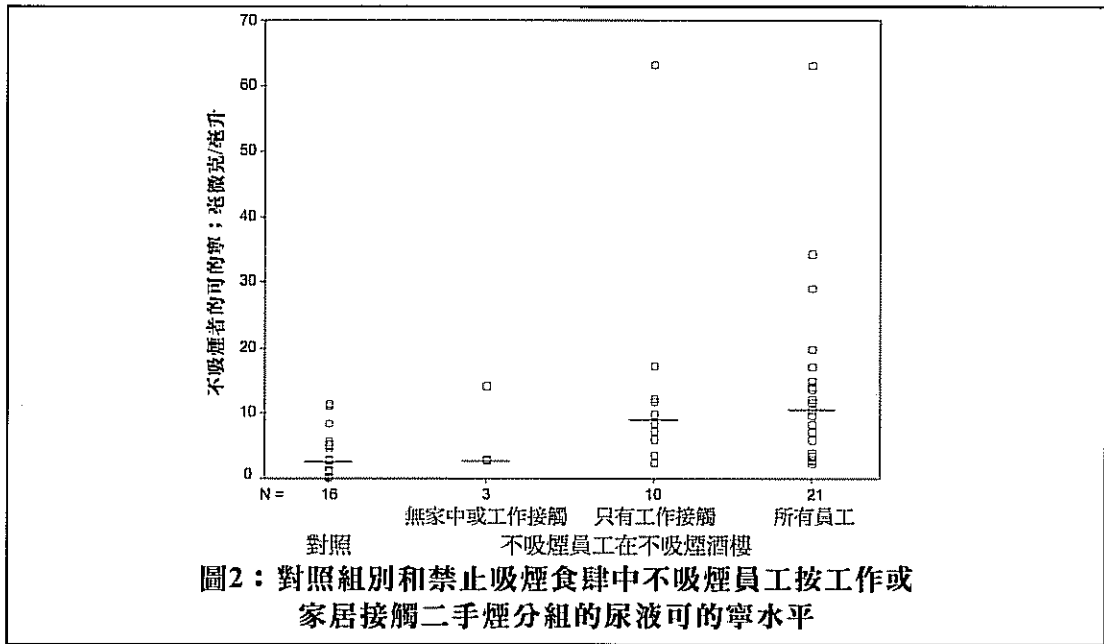
整體來說，那些宣稱很少接觸到二手煙的對照組別人士的的可的寧含量最少。最低風險的一組包括醫生、護理人員及任職於大學公共衛生系的僱員全為不吸煙者。他們工作於全面禁煙之環境和經常設法避免接觸二手煙。屬高含量一組之不吸煙人士為工作於部份或全不禁煙的食肆的侍應員及其他員工。一如所料，經常吸煙人士的尿液的的可的寧含量比對照組別及不吸煙僱員高出百分之數千(圖1)。

由是次研究從各方面搜集所得的資料顯示，飲食業僱員由於顧客、其他員工、又或於家居及休閒時間接觸二手煙是會令體內的的可的寧含量有重大差異。以下的各段簡述，是基於各結論圖表的資料。

對照組別： 這組別總共有 16 位對象，其中 13 位沒有於工作間或其他地方接觸二手煙，他們平均可的寧含量為 3.3 (標準差異為 3.5)。而其餘 3 位宣稱在工作以外地方接觸過二手煙的人士的平均含量則高出 67%，達 5.5 (標準差 4.9) (表 1)。

工作於“無煙”食肆的員工： 這些於無煙食肆工作的僱員的的可的寧含量有極大差異，而這些食肆被定為“無煙”乃因他們為公眾提供不吸煙的飲食環境。總體上，三位並未於工作以外地方接觸二手煙，及宣稱





在工作時避免或沒有接觸由非顧客造成的二手煙的員工的可的寧含量最低，只有 6.4 (標準差 6.6)。但是大部份員工 (13/21; 62%) 都曾因其他員工於工作休息時間吸煙而接觸到二手煙。他們平均可的寧含量幅度由 9.9 至 14.0，比那些沒接觸此等二手煙員工高出 50% 至 118%。比最低風險的對照組別更高出 200% 至 324%。(圖 2)

工作於全面禁煙食肆的員工因為曾在工作間受其他員工吸煙所影響，所以其可的寧含量與那些工作於部份禁煙食肆的員工同樣高。

工作於“部份禁煙”食肆的員工：這部份結果是有關受僱於准許吸煙但以不同形式劃分 禁止吸煙 區或座位的食肆。那些並未於工作以外之地方或於工作中接觸由非顧客造成的二手煙的僱員的可的寧含量最低，只有 6.1 (標準差 6.4)，比是次研究中的最低風險的對照組別高出 85%。

那些曾透過其他途徑而接觸二手煙的員工的平均值都較高。可的寧含量由一位只於家居及休閒時接觸二手煙員工的 7.1，上升至那些於工作休息時接觸二手煙的員工的 14.3 (標準差 10.8)。而有 20 位在以上兩處地方皆接觸二手煙的員工的可的寧平均含量為 16.6 (標準差 17.6)。這些平均值比對照組別人士的高出 333% 至 403%。(表及圖 1)。

工作於“沒有管制吸煙”食肆的員工：整體來說，工作於沒有管制吸煙食肆的員工的平均可的寧含量水平及量值幅度均比那些宣稱比較少接觸二手煙的員工為高。四位並未於工作以外地方及未受非顧客造成的二手煙影響員工的平均值為 15.9 (標準差 6.5)，而 34 位曾接觸非顧客二手煙的員工的平均值為 28.7 (標準差 33.9)。那些在家居/休閒時及/或由於非顧客途徑而接觸二手煙的員工的可的寧含量幅度為 20.0 至 26.6。總括來說，這組 52 位於沒有限制吸煙食肆工作的員工之中，並沒有接觸其他員工造成的二手煙的可的寧平均值為 20.4 (標準差 9.5)。除了顧客亦有受其他員工吸煙影響的可的寧平均值為 26.6 (標準差 31.4)。(表及圖 1)

侍應員及非侍應員的可的寧含量：當以工作性質而把飲食業員工歸類，工作於同一食肆但不同崗位的侍應員及其他員工的平均可的寧值並沒有顯著的不同。

惟是次研究中有個別幾位侍應員的可的寧值是最高的。例如工作於部份禁煙食肆的非侍應員的平均可的寧含量是 14.0 (幅度 1.0-35.0)，而侍應員為 14.2 (幅度 1.4-75.4)。工作於沒有禁煙食肆的非侍應員的平均可的寧含量是 23.0 (標準差 17.3) (幅度 0.03-57.3)，而侍應員為 26.9 (標準差 33.3) (幅度 0-129.4)。三位於部份禁煙或沒有禁煙食肆工作的飲食業員工錄得較低的可的寧值，而其中兩位並非侍應員。

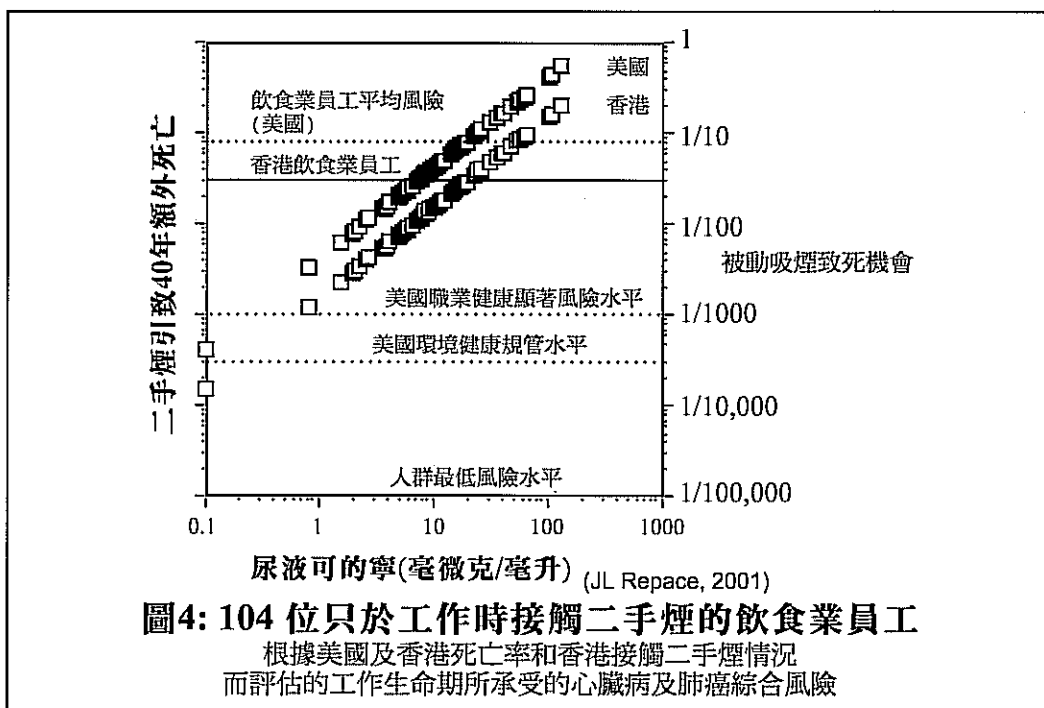
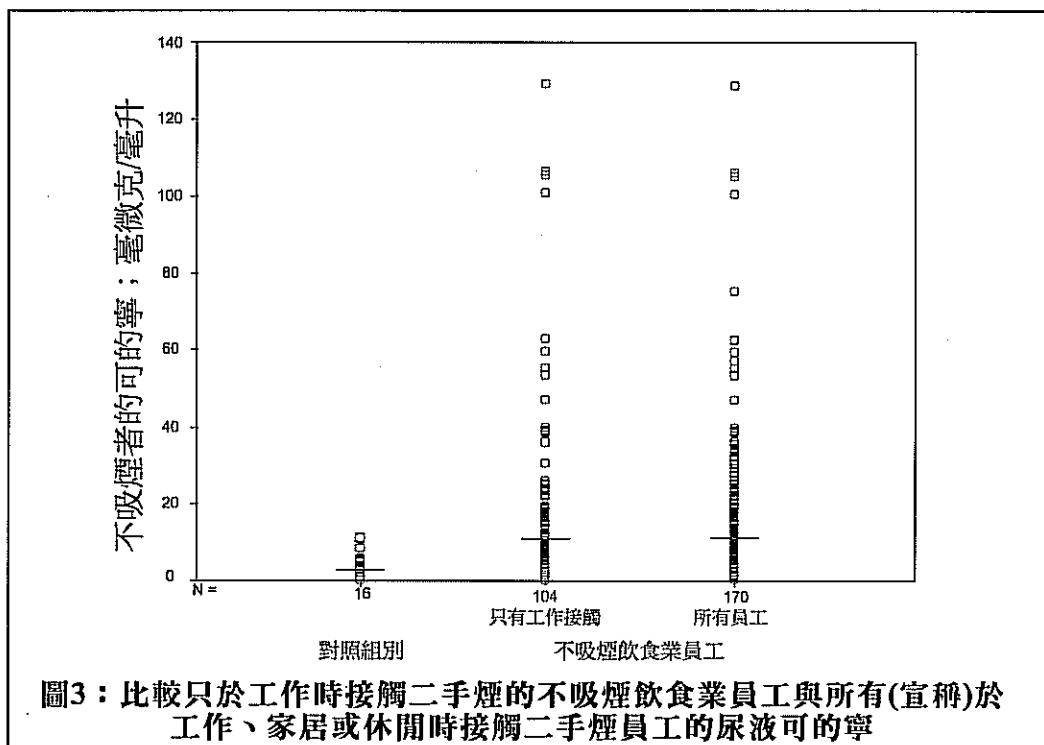
因工作而接觸二手煙及性別分組的可的寧含量的變化：那些只於工作時才接觸二手煙的食肆員工，其平均尿液可的寧含量高出對照組人士達 464%。這 104 位員工的平均可的寧值為 18.6 (標準差 22.6) (幅度 0-129.4)，相比於此值，全數 170 位員工可的寧平均值為較低之 17.0 (標準差 20.0) (幅度 0-129.4) (圖 3)。因此並沒有證據顯示員工之偏高可的寧值主要是從工作以外接觸到二手煙 (圖 3) 引致的。男女員工的可的寧含量並無顯著差異。

通風系統及可的寧含量：大部份只於工作時間才接觸到二手煙的僱員 (98/105; 93%) 指出其工作地方有空調系統。一般而言，這些僱員的可的寧含量與工作於沒空調系統的僱員的一般高或較高。

相比於剛剛完成工作或在進行調查時正工作的員工，那些調查前 12 小時內不須輪值員工的可的寧值較低 (表 3)。這反映接觸二手煙的程度及體液中可的寧的生物半生期 (biological half-life) 特性。

表 3：可的寧含量與員工輪值關係

食肆類型	最後輪值時段			
	超過 12 小時前	少過 12 小時前		
	平均值 (標準差)	人 數	平均值 (標準差)	人 數
禁煙	4.9 (1.3)	2	14.8 (14.4)	19
部份吸煙	11.7 (9.2)	26	15.4 (14.1)	52
無管制吸煙	21.7 (36.3)	11	26.8 (27.7)	41



自稱吸煙人士：在被歸類為“間中吸煙”者中，那些並沒於工作以外地方接觸二手煙者平均可的寧含量為145.0 (標準差 118.4)。這吸煙次組別人士可的寧平均值為 250.2 (標準差 298.6)。這次組別人士吸煙量有所差異，而某些人很低。其中4位的可的寧值超過200，而其餘3位則界乎2.2至121.8。

經常吸煙者的平均可的寧含量是 3589。這組別人士的差異極可能反映個人吸煙模式及劑量，多於二手煙的接觸。

心臟病及肺癌的綜合風險：是項研究為 104位 只於工作時才接觸二手煙的不吸煙員工計算風險，而此計算是基於他們尿液的可的寧含量。這群人士的尿液可的

寧平均濃度為每毫升 18.6毫微克，中位值 (median) 為每毫升 11.1毫微克。百分九十位數 (90th percentile) 為每毫升 39.1毫微克，而很多員工的可的寧值都超過每毫升 40毫微克。

以美國人心臟病和肺癌死亡資料，計算出這組人士的40年工作生命期的心臟病及肺癌綜合額外風險是 7.8%，即是每13人就有一個有風險。但是由於香港心臟病死亡率比美國較低(相差 2.6倍)，經調整後香港的工作生命期的額外風險是3%，即是每33人中有一個(圖 4)。顯示在現時約二十萬飲食業員工中，我們可預測每年平均有 150人因被動吸煙致死(或是在工作生命期中有 6,000人致死)。這 6,000死亡人口中，有

3,840人(64%)是從不吸煙的員工。在圖4中標有最低風險程度，表示生命額外死亡風險為一百萬人中，只有一位死亡。以規管觀點來看，被認定為一個可接受的程度。圖中的美國環境健康規定程度(*US Environmental Health Regulatory Level*)，即估計風險高達萬份三，已被認為極之不安全，可令美國聯邦規管機構行動去降低風險。

任何針對二手煙的措施及管制的目標應以風險程度減至零或最少達到最低程度。

5. 評論

基於是次樣本的結果，我們得出以下結論：大部份香港的飲食業僱員包括侍應員及其他員工均在他們工作地方受到嚴重二手煙影響，對他們目前及將來的健康構成主要風險。

沒有任何一組經測試僱員的平均可的寧含量達到對照組別人士的低水平，事實上大部份僱員的可的寧含量倍於對照者。在工作地方由其他員工造成的煙草煙霧(即非顧客吸煙)顯然是所有飲食業員工接觸二手煙的主要途徑。這亦是於禁煙食肆內工作之員工接觸到二手煙的根源。那些曾接觸非顧客造成二手煙的僱員的可的寧含量比沒有接觸此等二手煙的僱員高出兩倍多。在食肆內之非顧客吸煙情況很明顯地對於僱員及顧客都造成危害。這與已被證實之室內環境煙霧散播理論中預測的一樣。

可能有人會對是項調查結果的真確性存有疑問，尤其是間中吸煙人士會否被錯誤歸類。事實上，間中吸煙人士相對地並不普遍。我們相信是項調查已有效地以問卷及呼氣一氧化炭測試排除吸煙者於研究對象外。在其他調查中，例如加拿大的不吸煙酒吧服務員(Repace 2001)都被發現極高的可的寧值(>85)。在本調查中，有4位不吸煙飲食業員工的可的寧值高於75(3女、1男；可的寧值為101.1, 105.4, 106.5及129.4)。這幾位研究對象都是在沒有管制吸煙的食肆任職侍應員，全部表示有多位同事在他們附近吸煙。他們在調查進行當日正在工作，而且在前一日亦有上班。他們全都表示於工作以外並沒有接觸二手煙，我們相信他們是被動吸煙者。不計算這幾個偏高的可的寧值於結果內只會將所有只於工作時接觸二手煙食肆員工的可的寧平均值由每毫升18.6降至15.0毫克。對調查結果並無影響。

是次研究亦顯示對於不吸煙人士，於家居及休閒時接觸到二手煙均會導致嚴重影響。所有參與是次實驗研究中次組別人士如果在家居或休閒地方吸入二手煙，他們的可的寧含量顯著偏高。

市民接觸二手煙的情況明顯地遍佈全港，因為在16位“低風險”組別人士中，只有2位(13%)的可的寧含量為零。這結果相比於最近由美國疾病控制中心所進行的人口調查中的結果，有很大差異。因為美國全國於公眾及室內地方廣泛禁煙後，調查中有一半研究樣本未能量度到有任何可的寧含量。

是次研究的最低風險組別(那些並沒於家居或休閒時接觸二手煙)的尿液可的寧平均含量為每毫升3.3毫克實屬一個不可接受的結果，因為以美國標準計算，患上冠心病而死亡的額外風險超過百份一，高於工作

生命期可接受風險之標準的百萬份一。

政府應增加資源教育公眾，有關二手煙，特別是家居二手煙對身體健康的嚴重影響。

一份新西蘭最近的研究指出，酒吧及食肆僱員所吸入的煙草煙霧量可以跟吸煙者一樣高。那些於沒有吸煙限制工作場所工作的不吸煙者，頭髮中的尼古丁含量跟吸煙人士同樣高。

香港過往有關不吸煙者受二手煙影響的研究均指出，二手煙令不吸煙者的長期呼吸毛病(咳嗽、痰多、喘喘)次數增加，這同時亦令醫療使用次數、費用及因患病而要請病假的次數增多。

被動吸煙越來越被世界廣泛認定為職業健康的其中一項風險。

- 在1997年10月，6萬位美國飛行服務員成功贏得一項對跨國煙草公司的訴訟，獲得賠償。這次訴訟由一位患有肺癌的不吸煙飛行服務員提出。煙草商並不承認任何責任。
- 在荷蘭，一法庭於2000年5月規定僱主一定要保證不吸煙的僱員工作於完全沒有煙草煙霧的工作環境。這裁決是確認一位郵政員工的投訴，指她在工作時被迫接觸煙草煙霧是侵犯她可於無煙環境工作的權利。法庭裁定她的僱主要受憲法賦予市民，保障其“生理完整”及“健康”的權利規限，須要提供無煙工作環境。法庭指那些僱主並未能保障這項列於勞工法例中的權利。
- 在2001年5月，澳洲一位不吸煙的酒吧服務員，因在一家整日煙霧瀰漫的酒吧工作11年而患上癌病，獲得賠償235,000美元。澳洲已有很多州份已於酒吧、會所及餐廳禁煙，而一項相類的禁煙法例將於2001年9月在新南威爾斯州實施。

本調查顯示於部份或完全沒管制吸煙地方工作員工，其可的寧含量持續偏高。指定吸煙區內之吸煙者密度上升，會增加於該吸煙區內服務員工的健康危機。在有分隔通風設備的吸煙室及雪茄棧中，二手煙粒狀物及氣體，包括對心血有害的毒素及致癌物的濃度，可預料會非常高。吸煙後的空氣污染仍然存在，其中部份是由聚積在傢俱及裝修中的煙草污染物釋出。現時對顧客及僱員的風險皆被忽視。

現時已很清楚大幅增加通風系統強度至不可忍受的“颱風”水平全不實際(JL Repace: Repace@erols.com)，通風技術是不可能控制及減低二手煙的風險至最低程度(百萬份一)。

相反，被動吸煙對於飲食業員工健康的損害是完全可預防的。美國加州在設立無煙酒吧及酒坊後，在這些地方工作的僱員的呼吸系統健康迅速獲得改善。本調查證實在香港被迫於工作間吸入二手煙的僱員，其血液循環系統中尼古丁新陳代謝物含量顯著地高。可的寧可反映他們體內可導致心臟病、癌病及呼吸系統疾病的毒素的含量。

另一方面，煙草業及酒店業中多個界別繼續(i)否認二手煙是毒物，(ii)否認員工及顧客因吸入二手煙而受傷

害，(iii) 反對於工作間及公眾場所訂立預防被動吸煙、改善環境及公眾健康的措施。事實上，並無任何正式之經濟分析顯示有關措施對飲食業業務及旅遊業有任何負面影響。煙草業指有關措施會對飲食業生意及職位造成損失，引起了不合理的關注。現時，我們看不到有任何理由，不為香港僱員作出保護，以避免二手煙帶來的健康風險。

立法提供及確保完全無煙的室內工作間，是唯一可解決這廣泛問題的完善方法，而且亦是香港急需推行的一項公共衛生及職業健康措施。

由食肆自律承諾及實施守則並不可行，且會造成眾多監管及執行問題。立法於所有公眾地方禁煙是唯一具成本效益及保障員工的可靠措施。任何僱員，無論是吸煙或不吸煙者，皆不應在一個受煙草煙霧污染的環境工作。香港未來的工作間控煙原則必須奠於「沒有僱員應被要求在有煙草點燃的環境下工作」的方向。

要堅持此項原則亦不應容許於室外之飲食場所吸煙。任何形式的部份禁煙措施只會對不吸煙者帶來被動吸煙的風險。

結論摘要及建議

- 1 全球最權威的，有關二手煙所引致健康問題的科學文獻均清楚顯示，二手煙霧的毒性非常高，並且是造成眾多健康問題，包括慢性呼吸系統疾病、冠心病及癌病的原因。
- 2 香港大部份飲食業僱員均於工作間接觸到二手煙。他們大多數的尿液可的寧濃度顯示他們日後患上胸及心臟疾病及癌症的風險顯著增加。
- 3 是項最新調查中，大部份不吸煙之研究對象因接觸二手煙，而令他們在工作生命期中患上心臟病及肺癌的額外風險增加。飲食業員工的平均額外風險為3%，或三十三份一。我們估計，在二十萬飲食業員工中，6,000人將因被動吸煙而導致的心臟病和肺癌而死亡，其中3,800人(64%)是從不吸煙者。
- 4 很多工作於無煙工作間的“低風險”對照組別人士的尿液中均發現有可的寧含量，顯示這群人士的家居與休閒活動地方，及所到的其他工作地方已為煙草煙霧所污染。
- 5 對於二手煙問題，通風系統工程並不能提供切實的解決方法。而唯一安全及最具成本效益的策略是在所有食肆及其他工作間訂立“無煙”條例。基本原則就是任何僱員都不應為保職位，而需於受煙草煙霧污染的環境中工作。
- 6 香港所有的工作間都急需有效及可執行的法例，以確保所有員工不會吸入二手煙。
- 7 禁煙條例絕不應有任何例外或妥協條件，以致員工的健康受到威脅。
- 8 政府應緊急檢討現行指定吸煙區法例，包括有隔離通風系統的吸煙室，特別是那些經常有僱員工作的地方，如雪茄棧等。對那些工作於任何形式吸煙室或指定吸煙地方員工健康的影響，應作詳細研究及重申評估。
- 9 飲食業及酒店業現應帶領，率先於所有場所實行全面無煙政策，以保護員工及顧客的健康。
- 10 市民大眾、傳媒、各議員們，特別是飲食業應注意到煙草業在多年來皆一直否認及歪曲有關二手煙及被動吸煙的研究發現。
- 11 我們預料煙草業會試圖令人不信任這項香港最新的研究發現，但實際上，很多不須爭論的原因均已足夠支持政府全面實施禁煙政策，以迅速消除二手煙的危害。

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鳴謝

這項計劃由香港吸煙與健康委員會資訊及研究委員會(主席：劉明珠教授)提出。我們謹向所有參與是項計劃之食肆，完成問題及提供尿液樣本的飲食業從業員及對照組別人士致謝。對於瑪麗醫院臨床生化組主任及顧問譚志輝醫生的專業意見及協助處理尿液樣本，我們深表謝意。我們亦要多謝戚玉霜女士的協助，籌備本報告。

C O S H

HONG KONG COUNCIL ON SMOKING AND HEALTH

Passive smoking and risks for heart disease and cancer in Hong Kong catering workers 2001

May 2001

Report No. 8

Second-hand smoke exposures and passive smoking in non-smoking catering workers in Hong Kong: the combined risks for heart disease and cancer

AJ Hedley, SM McGhee, J Repace, TW Wong, MYS Yu, AYW Chan, TH Lam,

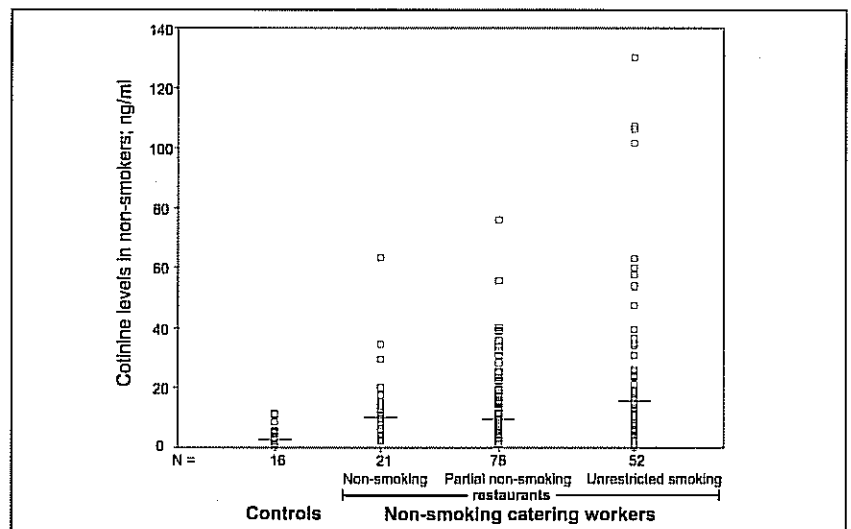
PCK Lo, M Tsang, LC Wong, ALN Chan, ESL Ng, M Janghorbani

Hong Kong Council on Smoking and Health; Department of Community Medicine, University of Hong Kong;

Department of Community and Family Medicine, Chinese University of Hong Kong, and

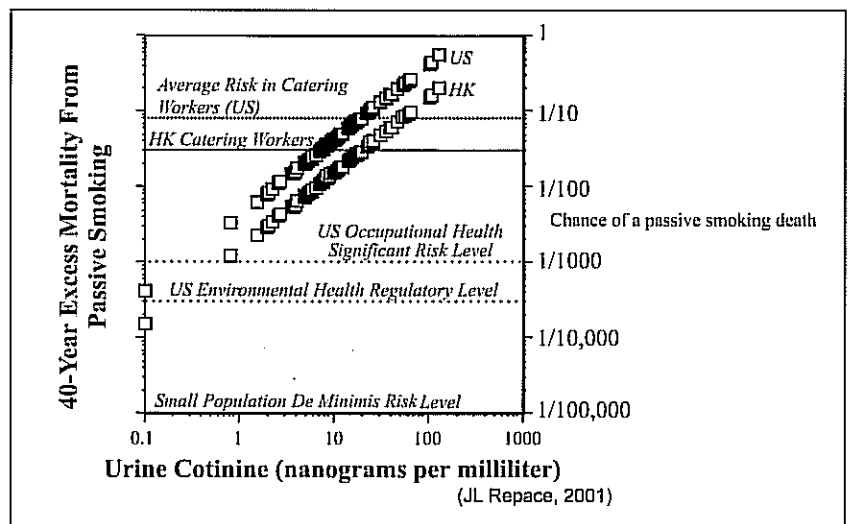
Repace Associates Inc, Bowie MD (<http://www.repace.com/>), USA

Urine cotinine levels in non-smoking catering workers and controls



104 catering workers, exposed to second-hand smoke only at work

Working lifetime combined risk from fatal heart disease & lung cancer based on both US and Hong Kong mortality rates and Hong Kong exposures to passive smoking



1. Background

Second-hand smoke and passive smoking: Passive smoking results from non-smokers breathing air which is contaminated with second-hand smoke made up of *mainstream smoke* exhaled by smokers and *side-stream smoke* emitted from the tips of burning cigarettes and cigars. Second-hand smoke is extremely poisonous; it contains over 4000 chemicals in the form of particles and gases.

Health hazards: Exposures to second-hand smoke are the cause of many health problems in non-smokers. These include extreme irritation to mucous membranes in the eyes, nose and throat; chronic respiratory symptoms such as cough, phlegm and wheeze and exacerbations of asthma. Asthmatics experience a decline in lung function when exposed to second-hand smoke. Passive smoking also causes damage to blood vessels so that non-smokers are at increased risk of heart attacks and stroke. Passive smoking is a hazard to the health of pregnant women and the foetus. Children are extremely sensitive to second-hand smoke and those with passive smoking exposures have more health problems including middle ear disease, bronchitic symptoms, acute chest infections and emergency admissions to hospital.

Second-hand smoke contains a high concentration of carbon monoxide which is implicated as one cause of heart disease in smokers. Tobacco smoke also increases platelet aggregation and causes changes in blood clotting mechanisms. Cancer causing compounds in second-hand smoke are inhaled and pass into the circulation. Exposure of non-smokers to tobacco smoke leads to increased blood and urinary concentrations of tobacco-specific cancer causing substances.

The US Environmental Protection Agency (EPA) and the UK Government Department of Health Scientific Committee on Tobacco and Health (SCOTH) and many other national and international agencies accept the evidence that exposures to passive smoking cause lung cancer and conclude that second-hand smoke is a *proven human carcinogen*.

No safe threshold: In terms of its cancer inducing potential there is no known safe level of second-hand smoke. Neither simple measures designed to separate smokers from non-smokers nor ventilation engineering will prevent passive smoking when a common air space is contaminated with tobacco smoke.

In 1999 the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) eliminated all reference to any level of smoking being permissible from the ANSI/ASHRAE indoor air quality standards. This standard now makes it clear that the governing standard (ANSI/ASHRAE 62-1989) is based on a totally non-smoking environment.

The prevention of passive smoking: There is increasing awareness and acceptance in Hong Kong, on the part of the Government and the general public, that effective controls are needed to prevent involuntary passive smoking in all public places and in the workplace. At the present time very few indoor places meet the necessary criteria to ensure that the public and the workforce are protected against second-hand smoke exposures.

One major deficiency in the present legislation concerns the catering industry where there is no protection for most customers and none at all for workers. The requirement for restaurants with 200 or more seats to offer one third of

seating in "smoke-free" sections is a token arrangement which cannot meet even the minimum criteria and public health requirements for a smoke-free indoor environment.

Two previous reports on Hong Kong public opinion by COSH, in 1995 and 2000, showed that the overwhelming majority of the public wanted smoke-free dining facilities and that patrons would eat out more often given assurances of smoke-free facilities; in other words it would be good for business. A large proportion of the customers in these surveys frequently experienced adverse exposures to second-hand smoke including foul odour, contamination of clothes and hair, irritation of eyes, nose and throat, and asthma/ wheezing or other respiratory problems. Over one third formed an unfavourable impression of the restaurants concerned and considered taking their patronage elsewhere.

Two previous studies in Hong Kong have shown that passive smoking in the workplace is a major cause of chronic respiratory problems in Hong Kong. This report examines the preliminary results of a new survey of non-smoking workers in the catering industry, which aimed to assess their passive smoking exposures in different work settings and their risks for heart disease and cancer.

2. Objectives

The objectives of this pilot study were to

- document workplace and other exposures to second-hand tobacco smoke in non-smoking catering workers
- collect and analyse urine samples for cotinine which is a breakdown product of nicotine and an indicator of passive smoking in non-smokers
- estimate the combined working-lifetime risks for heart disease and lung cancer in Hong Kong catering workers.

3. Subjects and Methods

Subjects: A total of one hundred and eighty four catering workers were recruited to the study and 165 provided complete data on exposures to second-hand smoke. All were volunteers, invited on the basis that they were non-smokers but any smokers who wished to participate were accepted. They received \$100-\$150 (including travel expenses) for their participation. They were asked to complete an interview schedule and give a 50 ml sample of urine. All subjects were tested using a monitor to detect carbon monoxide in their breath (expired air). Carbon monoxide levels in human breath are usually less than 10 parts per million (ppm) in non-smoking subjects. Fourteen subjects were found to be (or declared that they were) occasional or regular smokers and 170 (83 male and 87 female) were non-smokers. Seven subjects were found to be *regular smokers* either because of self-declaration or raised breath carbon monoxide (>9 ppm) and seven more admitted to being *occasional smokers*, defined as using less than 7 cigarettes per week. Their results are included in the findings for comparison with the other groups (Table 1). The majority (86%) of workers were employed in restaurants which permitted smoking. The remainder were from catering facilities which did not permit any smoking by customers (Table 2).

An additional sample group of 16 control subjects were recruited, being physicians, nurses or university researchers. All were non-smokers who worked in a smoke-free workplace and who generally avoided smoky environments.

Table 1: Catering workers and urinary cotinine levels by exposure to second-hand smoke at work, home and leisure activities

Subjects	Exposure outside work	Non-customer exposure	Mean	N	SD	Range
Controls						
	no exposure outside work	nil	3.3	13	3.5	0-11.2
	home or leisure exposure	nil	5.5	3	4.9	1.1-10.8
	Total	nil	3.7	16	3.7	
Worker in non-smoking restaurant						
	no exposure outside work	nil	6.4	3	6.6	2.6-14.0
		other staff or break	14.0	10	17.7	2.2-62.9
		Total	12.3	13	15.9	
	home or leisure exposure	nil	20.3	5	11.9	3.9-34.1
		other staff or break	9.9	3	3.9	5.8-13.6
		Total	16.4	8	10.7	
	Total	nil	15.1	8	12.0	
		other staff or break	13.1	13	15.5	
		Total	13.8	21	14.0	
Worker in partial smoking restaurant						
	no exposure outside work	nil	6.1	6	6.4	1.5-18.6
		other staff or break	14.3	50	10.8	2.0-55.3
		Total	13.4	56	10.7	
	home or leisure exposure	nil	7.1	1		7.1
		other staff or break	16.6	21	17.2	1.0-76.4
		Total	16.2	22	17.0	
	Total	nil	6.3	7	5.8	
		other staff or break	14.9	71	13.0	
		Total	14.2	78	12.7	
Workers in unrestricted smoking restaurant						
	no exposure outside work	nil	15.9	4	6.5	7.6-23.1
		other staff or break	28.7	34	33.9	0-129.4
		Total	27.4	38	32.3	
	home or leisure exposure	nil	26.5	3	10.5	14.7-34.6
		other staff or break	20.0	11	21.9	0.03-62.3
		Total	21.4	14	19.8	
	Total	nil	20.4	7	9.5	
		other staff or break	26.6	45	31.4	
		Total	25.7	52	29.4	
Occasional smoker						
	no exposure outside work	other staff or break	145.0	6	118.4	2.2-286.8
	home or leisure exposure	other staff or break	881.4	1		
	Total	other staff or break	250.2	7	298.6	
Regular smoker						
	no exposure outside work	other staff or break	2996.3	3	1695.0	1281-4671
	home or leisure exposure	other staff or break	4034.0	4	1274.1	
	Total	other staff or break	3589.2	7	1441.2	

Table 2: Number (%) of non-smoking workers by type of catering facility

Non-smoking restaurants		24
Fast-food	22	
Western/Eastern	1	
Canteen	1	
Smoking restaurants		146
Chinese restaurants	70	(41.2)
Cha Cham Ting	31	(18.2)
Fast food shop	6	(3.5)
Western/Eastern	8	(4.7)
Club/canteen/caf	31	(18.2)
Total		170

Cotinine: When nicotine in tobacco smoke is absorbed into the circulation it undergoes metabolic breakdown in the liver into other compounds, including *cotinine* which can be measured in blood, saliva and urine. In this way it can be used as a marker of exposure to the toxic components of second-hand smoke in non-smokers who become passive smokers. The urinary cotinine levels of all workers and the controls in this survey were measured by the MetLife Laboratory in New York (Dr N Haley). The cotinine values are expressed as nanograms (ng) per milliliter of urine.

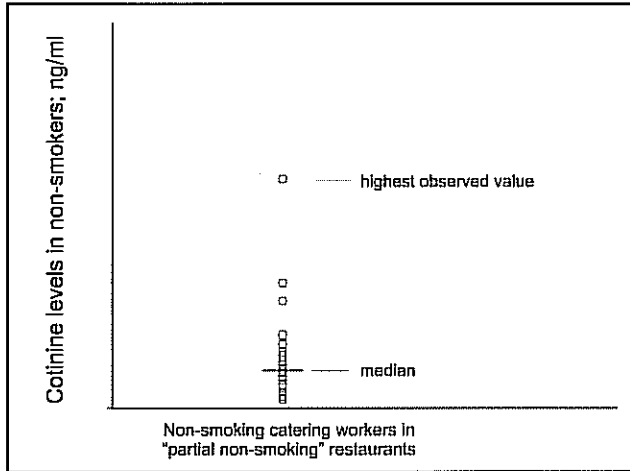
Interview: In addition to basic demographic information, workers were asked about workplace, home and leisure exposures to tobacco smoke. The numbers and proximity to them of smokers in their workplace were documented whenever possible. The workers' past active smoking history was recorded when relevant and the time since quitting was recorded. Finally questions about respiratory and cardiovascular health, including diagnoses and current symptoms were included.

Analyses: *Urinary cotinine levels* were analysed by main groups and sub-groups, defined by their worker or control status, workplace type and reported exposures to tobacco smoke from any source.

The classification of subjects has initially been carried out on an *a priori* basis using their criteria for selection (ie "control", or "catering worker") or their place of work (ie "non-smoking" or "smoking" catering facilities).

These findings have been further explored by subgroups, including "non-waiter" (eg accounts clerks, housekeepers, chefs, others), and "waiter" (anyone serving tables as waiter or senior restaurant supervisors). Exposures have been examined by the workers' declarations of "other exposures" including staff smoking, exposure during rest times, home and leisure activities.

The graphics for the urinary cotinine values are presented as dot charts as shown in the example below. Each dot represents an individual cotinine value within the group tested; the lowest and highest dot indicate the range and the horizontal bar is the median or middle value. The cotinine values are measured as nanograms per milliliter (ng/ml).



The risk of heart disease and lung cancer in this sample of Hong Kong catering workers who are exposed to second-hand smoke has been estimated using a pharmacokinetic risk model developed by Repace and his co-workers. This enables cotinine levels in urine, saliva and plasma to be related to lung and heart disease in passive smokers. The risk is calculated for a 40 year working life time (WLT₄₀). Using this model Repace and Lowrey associated an average plasma cotinine of 0.4 ng/ml with a WLT₄₀ increased mortality for lung cancer of 1 in 1000. The model of estimated mortality associated with salivary cotinine level indicates that the risk for heart disease rises from 1 in 3000 to about 1 in 100 with a gradient of salivary cotinine of 0.1 up to 1 nanogram/milliliter. This risk model successfully predicted the risk observed in the American Cancer Society Cohort Study of passive smoking and lung cancer in non-smokers.

4. Findings

Overall, our control subjects with declarations of low exposures had the lowest cotinine levels. The lowest risk group in this survey, were doctors, nurses and members of a university department of public health who were non-smokers, working in a totally smoke free environment and

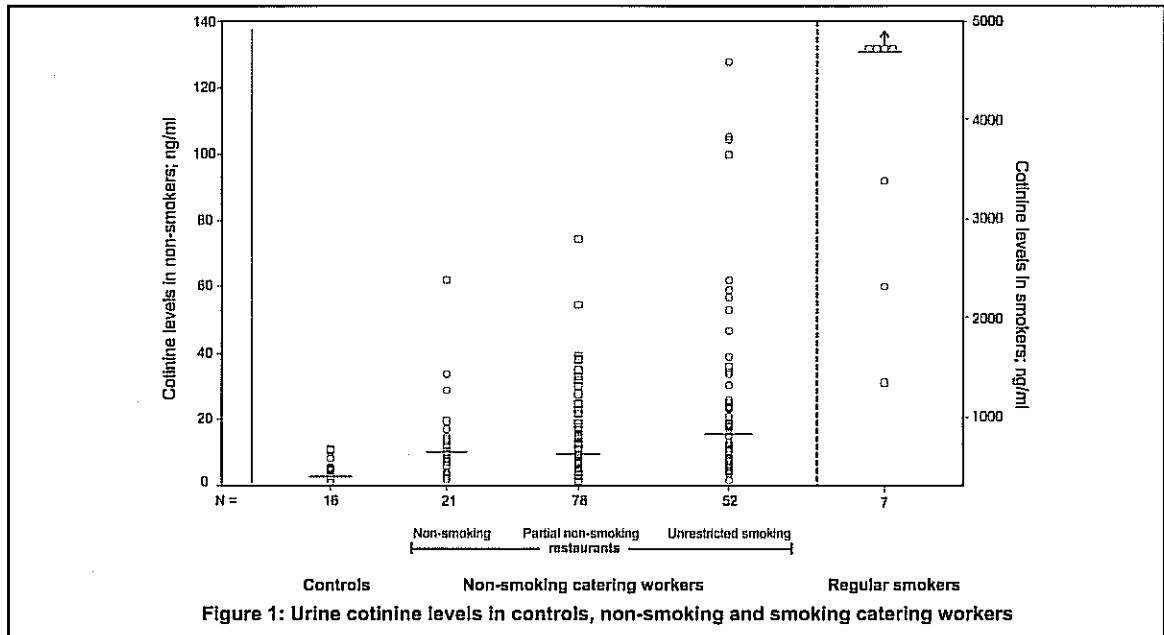


Figure 1: Urine cotinine levels in controls, non-smoking and smoking catering workers

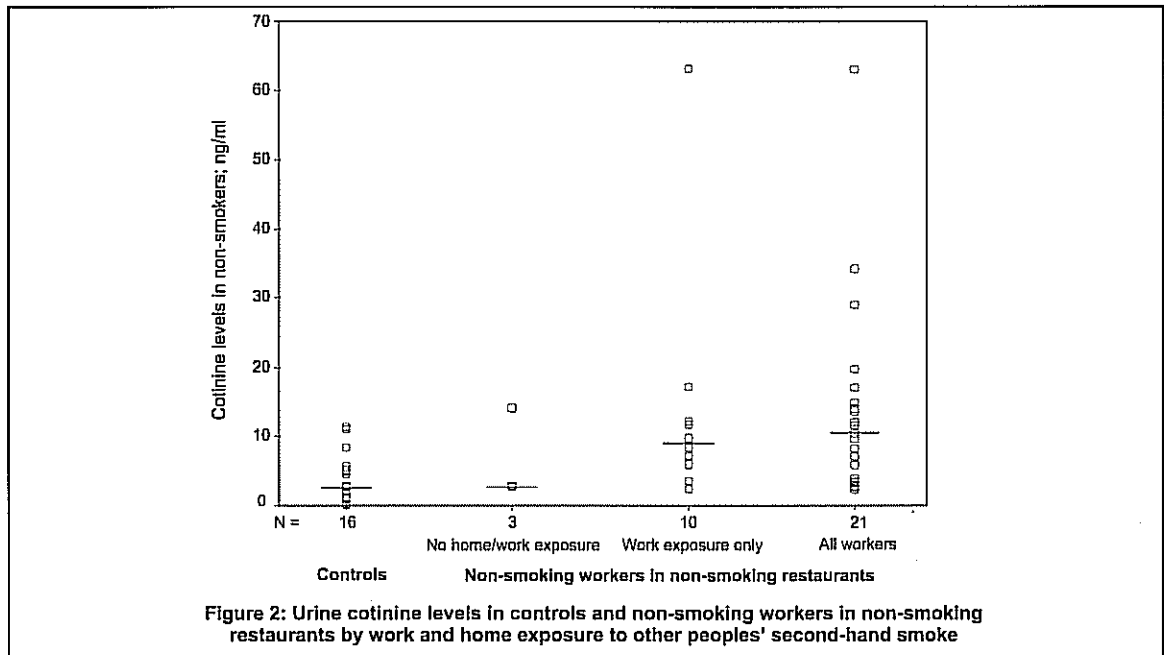


Figure 2: Urine cotinine levels in controls and non-smoking workers in non-smoking restaurants by work and home exposure to other peoples' second-hand smoke

who generally took action to avoid second-hand smoke exposures. At the high end of the non-smoking subjects were waiters and other staff in catering facilities with either partial smoke-free areas or no restrictions on smoking. The small group of regular smokers in the sample showed the expected very high levels of urinary cotinine which were several thousand percent higher than the controls and non-smoking workers (Figure 1).

The data are heterogeneous and show important variations in cotinine levels in catering workers by exposures to tobacco smoke from both customers and other staff, as well as home and leisure exposures. The following brief description is based on the data in the summary Table.

Controls: A total of 16 subjects were tested. Thirteen control subjects with no work or other exposures had a mean of 3.3 (median 2.6, range 0-11.2). In an additional three subjects who declared that they had exposures outside of work the mean cotinine was 67% higher at 5.5 (median 4.5, range 1.1-10.8) (Table 1).

Workers in "non-smoking" restaurants: There was considerable variation in cotinine levels in workers in those restaurants which were designated as "non-smoking" for the purpose of their catering services to the public. Overall, the 3 workers with no exposures *outside of work* who declared that they avoided or did not receive *non-customer exposures at work* had the lowest mean cotinine level at 6.4 (median 2.7, range 2.6-14.0). However a majority of staff (13/21; 62%) were in fact exposed to *non-customer second-hand smoke* because of other staff smoking at break times. Their mean cotinine levels range from 9.9 (median 10.3, range 5.8-13.6) to 14.0 (median 9.0, range 2.2-62.9), that is 50% to 118% higher than workers not exposed to this source and 200% to 324% higher than the lowest risk controls (Figure 2).

Because of exposure to staff smoking at work the cotinine levels in many workers in "non-smoking" restaurants were as high as those in workers in "partial non-smoking" restaurants.

Workers in "partial-non-smoking" restaurants: These findings relate to any worker employed in an organisation which permitted smoking but had various forms of smoke-free areas or seating. Those workers with no exposure *outside of work* and no *non-customer exposure* at work had the lowest cotinine at 6.1 (median 4.2, range 1.5-18.6); a figure which is 85% higher than the value for the lowest risk controls in this study.

Those with any other additional exposures to tobacco smoke had higher mean levels ranging from 7.1 in one subject associated with *home and leisure exposure* only, to 14.3 (median 9.6, range 2-55.3) in those with *other staff and/or break time* exposures, and a mean of 16.6 (median 12.0, range 1-75.4) in 21 workers with both *home/leisure* and *staff/break time* exposures. These mean values are 333% to 403% higher than the control group (Table and Figure 1).

Workers in "unrestricted smoking" restaurants: Overall the mean cotinine levels and the ranges of values in all subgroups of workers in unrestricted smoking establishments were higher than those in workers who had lower declared exposures. In 4 workers with no exposures *outside of work*, and no *non-customer exposures*, the mean was 15.9 (median 16.5, range 7.6-23.1) compared with 28.7 (median 17.3, range 0-129.4) in 34 workers with non-

customer workplace exposure. For those with *home/leisure* and/or *non-customer exposures* the mean cotinines ranged from 20.0 to 26.5 (medians 10.4, 30.2, range 0.03-62.3). Overall for this group of 52 workers in unrestricted smoking establishments the mean for those who did not have exposures from other staff was 20.4 (median 18.2, range 7.6-34.6), and 26.6 (median 14.8, range 0-129.4) for those with staff/ break exposures in addition to customer exposures (Table and Figure 1).

Cotinine levels in waiters and non-waiters: When workers were classified into subgroups relating to their job description, no significant differences were found in the mean cotinine values between waiters and workers in other departments in the same establishment.

However some individual waiters had the highest cotinine values observed in the survey. For example the mean cotinine for non-waiters in partial-smoking restaurants was 14.0 (median 12.1, range 1.0-35.0) compared with 14.2 (median 9.4, range 1.4-75.4) for waiters. In the restaurants with unrestricted smoking the mean cotinine for non-waiter staff was 23.0 (median 18.6, range 0.03-57.3) compared with 26.9 (median 14.7, range 0-129.4) for waiters. Lower cotinine values were observed in 3 catering workers who worked in either partial-smoking or unrestricted smoking restaurants. Two of these were non-waiters.

Variations by work exposure and gender: The average restaurant worker, who had second-hand smoke exposures at work only, had a urinary cotinine which was 464% higher than the control subjects. These 104 workers, with work exposure only, had a mean cotinine of 18.6 (median 11.1, range 0-129.4) compared with a slightly lower mean 17.0 (median 10.9, range 0-129.4) in the whole group of 170 workers (Figure 3). There is therefore no evidence that the high cotinine values observed in workers are mainly due to second-hand smoke exposures outside of their work (Figure 3). There was no significant difference in cotinine levels between male and female workers.

Ventilation and cotinine levels: The majority (98/105; 93%) of catering workers who were exposed to tobacco smoke only at work, stated that air conditioning units operated in their workplace. In general cotinine levels in these workers were as high or higher than the levels in workers without air conditioning.

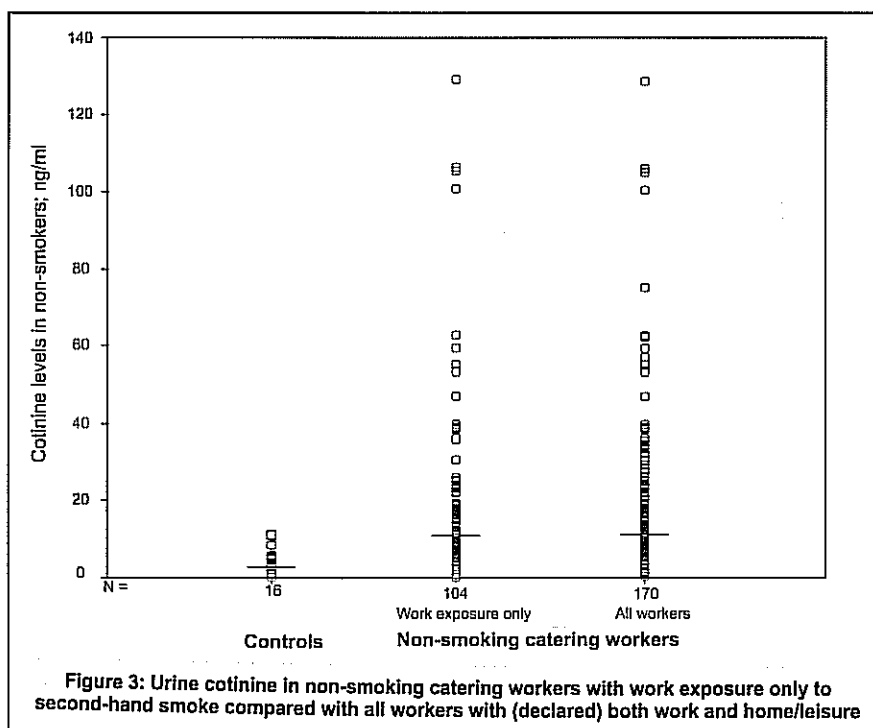
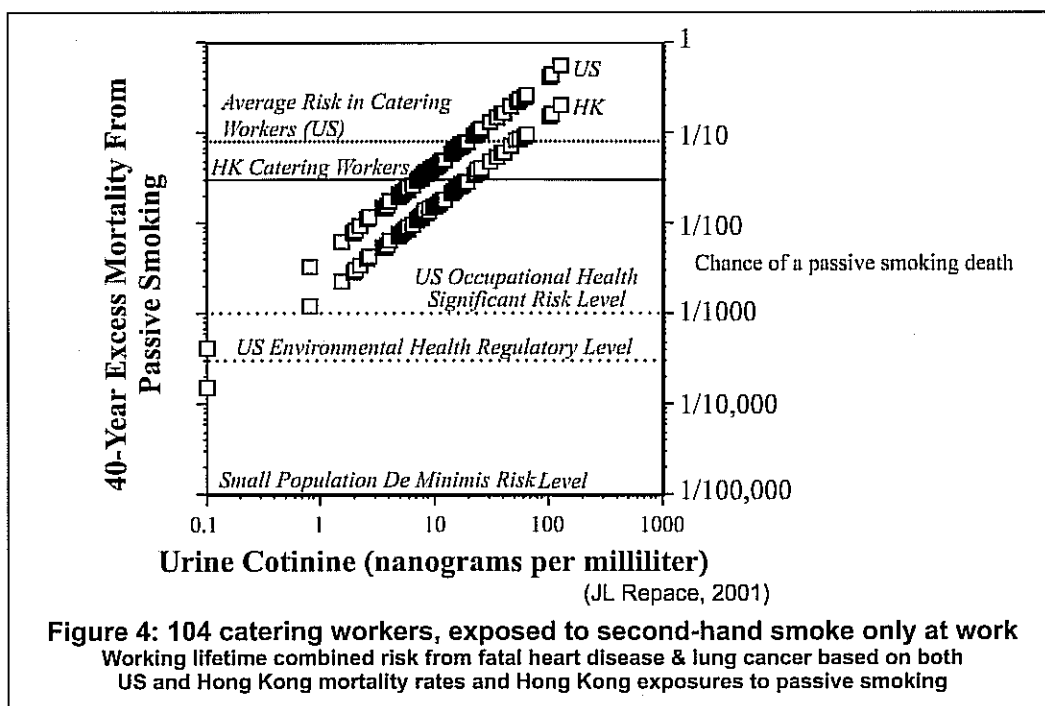


Figure 3: Urine cotinine in non-smoking catering workers with work exposure only to second-hand smoke compared with all workers with (declared) both work and home/leisure



The cotinine levels were lower in workers who had their last shift more than 12 hours previously, compared with those who had worked more recently or were at work during the survey (Table 3). This reflects the exposure levels and the biological half-life of cotinine in body fluids.

Table 3: Relationship between shift work and cotinine level

Restaurant type	Last shift More than 12 hours ago		Last shift Less than 12 hours ago	
	Mean (SD)	N	Mean (SD)	N
Non-smoking	4.9 (1.3)	2	14.8 (14.4)	19
Partial smoking	11.7 (9.2)	26	15.4 (14.1)	52
Unrestricted smoking	21.7 (36.3)	11	26.8 (27.7)	41

Declared smokers: The mean cotinine level for those who were classified as *occasional smokers* was 145.0 (median 167.9, range 2.2-286.8) for those with no exposure *outside of work*. The overall mean for this subgroup of smokers was 250.2 (median 213.9, range 2.2-881.4). The use of tobacco in this group was variable and very low in some subjects. Four out of seven had cotinine >200, the other 3 ranged from 2.2 to 121.8.

For *regular smokers* the mean cotinine was 3589 (median 4671, range 1282-4671) ng/ml. Variations within this group are likely to reflect mainly individual smoking pattern and amount rather than passive smoking exposure.

Combined heart disease and lung cancer risks: The risk calculations based on urinary cotinine levels were carried out on a selected subgroup of 104 non-smoking workers who only had work exposure to second-hand smoke. In this series the mean urinary cotinine concentration is 18.6 ng/ml and the median 11.1 ng/ml. The 90th percentile is 39.1 ng/ml and many workers have cotinine in excess of 40 ng/ml.

The 40 year working lifetime combined excess risk for heart disease and lung cancer is 7.8% (that is 1 in every 13 persons at risk) based on the US population mortality for heart disease and lung cancer (Figure 4). However, in Hong Kong, the present population mortality rates for heart disease are lower than in the US by a factor of about 2.6. The working lifetime excess risk for Hong Kong is

3% (that is 1 in 33 workers at risk) (Figure 4). This means that in the current population of catering workers (about 200,000), we predict 150 deaths per year of exposure from passive smoking, or 6,000 in a working lifetime. Of these 6,000 deaths, 3,840 (64%) will be in workers who have never smoked. Also marked on the graph in Figure 4 is the *de minimis* risk level, which corresponds to an excess lifetime mortality risk of one death in a million persons at risk and is considered acceptable from a regulatory point of view. An estimated risk level as high as 3 in 10000, marked on the graph as the *US Environmental Health Regulatory Level*, would be considered so unsafe that US Federal regulatory agencies almost always act to reduce them.

The aim of interventions and control of second-hand smoke would be to reduce the risk level to zero or at least to the *de minimis* level.

5. Comment

Based on the findings of this sample we can conclude that the majority of catering workers in Hong Kong, both waiters and other staff, have high levels of exposure to second-hand smoke in their workplace with a major risk to their current and future health.

None of the groups of workers examined had mean levels of cotinine as low as that of the control subjects and most were more than double this value. Tobacco smoke from other staff smoking (ie the *non-customer exposures*) within the workplace were apparently important sources of second-hand smoke for all catering workers. This was a major source of tobacco smoke exposure in those workers supposedly working in smoke-free restaurants. The mean levels of those exposed to non-customer smoking were more than twice the levels of those not exposed. Non-customer smoking in all restaurants is clearly a hazard to both workers and patrons, as would be expected from the well established parameters of smoke dispersion in all indoor environments.

Questions will be raised about the validity of the findings in this survey, and particularly about the possibility of misclassification of occasional smokers as non-smokers. Occasional smokers are relatively uncommon and overall

we believe that smokers have been effectively excluded from this sample by the questionnaire and breath carbon monoxide screening. Very high cotinine values (>85) have been found in other surveys, eg in non-smoking bar tenders in Buffalo, New York (Repace 2001). In our survey there were four cotinine values greater than 75 in non-smoking restaurant workers (3 female, one male; 101.1, 105.4, 106.5 and 129.4). All of these subjects worked as waiters in restaurants with unrestricted smoking; all stated that several co-workers smoked near to them and all were at work during the survey and had been at work the previous day. All stated that they had no exposure outside of work; we believe they are passive smokers. Exclusion of these four high values would only reduce the mean cotinine for all restaurant workers with work exposure from 18.6 to 15.0 ng/ml and would not affect the conclusions of the survey.

The data also show the importance of home and leisure exposures to second-hand smoke in non-smokers in Hong Kong. All of the subgroups in this pilot survey showed a marked tendency to have raised cotinine levels if they were exposed to smoke in their leisure venues or at home.

General exposures to second-hand smoke in Hong Kong are clearly widespread as only 2 (13%) out of the 16 "low-risk" control subjects had zero cotinine levels. This contrasts with a recent population survey by the US Center for Disease Control which showed that, as a result of countrywide smoking bans in public and indoor places in the United States, 50% of the sample had *undetectable* levels of cotinine.

The mean urinary cotinine in our lowest risk group in Hong Kong (those without any known home or leisure exposure) was 3.3 ng/ml, a finding which is totally unacceptable given that in the US it indicates a lifetime excess risk for coronary heart disease mortality of greater than 1 in a 100 compared with the normative *de minimis* standard of acceptable risk of 1 in 1,000,000.

The Government should increase the resources available to inform the public of the serious health hazards of second-hand smoke, including those associated with smoking in the home.

A recent study in New Zealand showed that the exposure of bar and restaurant staff to tobacco smoke can be as high as the exposure of active smokers. The hair nicotine levels of non-smoking workers in workplaces with no restrictions on smoking were as high as those in smokers.

Previous studies of non-smoking workers exposed to second-hand smoke in Hong Kong have demonstrated an increased frequency of chronic respiratory complaints (cough, phlegm and wheeze), increased health care utilization and costs and sickness absence from work.

Passive smoking is increasingly recognized as an occupational health risk world-wide. For example:

- In October 1997, 60,000 US flight attendants won a major settlement in a class action against transnational tobacco companies. The action was initiated by a non-smoking flight attendant who contracted lung cancer. The tobacco industry did not admit liability.
- In the Netherlands a court ruled in May 2000 that employers must guarantee that non-smoking staff have a working environment completely free of tobacco smoke. It upheld a postal worker's complaint that her exposure to tobacco smoke at work *infringed her right to work in a smoke-free environment*. The court ruled that her employers were bound by the constitutional rights of citizens, to protection of "physical integrity and "health", to provide such conditions. The employers failed to

satisfy this right under employment law.

- In May 2001 an Australian barmaid, a non-smoker, was awarded US\$235,000 for cancer caused by working for 11 years in a smoky bar. Most Australian states have already banned smoking in pubs, clubs and restaurants and a similar ban will come into force in New South Wales in September 2001.

Cotinine levels in this survey are consistently higher in establishments with partial or unrestricted smoking. Increasing smoker density in designated smoking areas increases the hazard to workers who have to service these areas. In separately ventilated smoking lounges and cigar divans the concentrations of second-hand smoke particulates and gases, including cardiovascular toxins and cancer causing substances, will predictably be very high. The contamination persists after smoking ceases and part of this comes from off-gasing from deposits on furniture and fittings. The risks to both patrons and staff are currently being ignored.

It is clear that ventilation technology cannot control and reduce the risk from second-hand smoke to minimal safety standards (1 in a million) *without massively impractical increases in ventilation and intolerable levels of air changes of "typhoon strength"* (JL Repace: Repace@erols.com).

However damage to the health of catering workers from passive smoking is wholly preventable. The establishment of smoke-free bars and taverns in California was followed by a rapid improvement in the respiratory health of the workers. The present survey confirms that workers in Hong Kong who are forced to breathe second-hand tobacco smoke in their workplace have markedly raised levels of nicotine metabolites in their circulation. We know that this is also an indicator of toxic exposures to substances which cause *heart disease and cancer* in addition to chronic *respiratory health problems*.

On the other hand the tobacco industry and many sectors of the hospitality industry continue to (i) deny that second-hand smoke is a poison, (ii) deny that both workers and customers are injured by breathing second-hand smoke, (iii) oppose the introduction of environmental and public health measures to prevent passive smoking in the workplace and public places. This is in spite of the fact that no *bone fide* economic analyses have shown any adverse impact on catering business or tourism. Tobacco industry propaganda has generated unjustified concern about loss of business and jobs. There is no reason why Hong Kong workers should not now be protected against the risks of passive smoking.

Legislation to provide and ensure totally smoke-free indoor workplaces is the only satisfactory solution to this widespread problem and it is urgently needed as a public health and occupational health measure in Hong Kong.

Voluntary agreements and codes of practice will not work and create many problems of monitoring and enforcement. Legislation on smoking bans in all public places is the only cost-effective and reliable means of protecting non-smokers. No workers, whether smokers or non-smokers should be obliged to work in a smoke contaminated workplace. *The principle on which Hong Kong's future workplace smoking controls must be based is that no worker should be required to work in an environment where tobacco products are burning.*

Adherence to this principle will not permit smoking in outdoor catering facilities. Partial smoking restrictions of all kinds leave non-smokers exposed to the risk of passive smoking.

Summary conclusions and recommendations

- 1 The world's best scientific literature on health risks from passive smoking clearly demonstrates that second-hand smoke is extremely poisonous and the cause of many health problems including chronic respiratory disease, coronary heart disease and cancers.
- 2 *The majority of catering workers in Hong Kong are exposed to second-hand smoke in their workplace and most of them have markedly raised urinary cotinine concentrations which indicate markedly raised health risks for chest and heart disease and cancer in addition to many other health problems caused by passive smoking.*
- 3 Most of the non-smoking subjects in this new survey have raised working lifetime excess risks for heart disease and lung cancer as a result of passive smoking. In catering workers the average excess risk was 3% or about 1 in 33. We estimate that among 200,000 catering workers, 6,000 will die from passive smoking due to heart disease and lung cancer; 3,800 (64%) of these deaths will be in never smokers.
- 4 *In a group of "low risk" control subjects from smoke-free workplaces, many had detectable cotinine levels indicating that for many of them the airspaces of their home, leisure activities or other worksites visited by them are contaminated by tobacco smoke. All non-smokers in Hong Kong should have no detectable cotinine in body fluids.*
- 5 There is no practical solution from ventilation engineering to the problem of second-hand smoke exposures; the only safe and most cost-effective strategy is to introduce smoke-free regulations in all catering facilities and other workplaces. **The principle must be that no worker should have to work in air contaminated with tobacco smoke in order to hold a job.**
- 6 *There is an urgent need for effective and enforceable legislation which will ensure that all workers in all workplaces in Hong Kong do not have to breathe second-hand smoke.*
- 7 There should be no exceptions to, or trade-offs in, smoke-free regulations which will lead to the health of workers being placed at risk.
- 8 *There should be an urgent review by Government of designated smoking areas including smoking lounges which are separately ventilated, and particularly those which are continuously staffed such as cigar divans. The health implications for all workers who service any type of smoking lounges or other designated areas should be examined and re-assessed.*
- 9 The catering and hospitality industry should take the lead now in implementing comprehensive smoke-free policies in all facilities to protect both staff and customers.
- 10 *The public, the media, legislators and particularly the catering industry should be aware that the tobacco industry has for many years consistently denied and obfuscated the findings of research into second-hand smoke and passive smoking.*
- 11 We fully expect that the tobacco industry will also attempt to discredit the findings of this latest investigation in Hong Kong, but there are incontrovertible reasons why Government policy to eradicate passive smoking should be fully implemented without further delay.

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Acknowledgements

This project was prompted by the Research Committee of COSH (Chair: Professor Edith Lau). We thank the management of all of the catering establishments and the catering workers and control subjects who completed the interview schedule and donated a urine sample. We are very grateful to Dr Sidney Tam, Consultant and Head of the Division of Clinical Biochemistry Unit, Queen Mary Hospital for his advice and help with the management of the urine samples. We thank Ms Marie Chi for clerical assistance and the typing of this report.