



Hong Kong College of Cardiology

## Pilot Community Survey of Cardiovascular Risks

Suet-Ting Lau

Chun-Wai Chiu

Wai-Suen Leung

Kin-Wah Chan

Follow this and additional works at: <https://www.jhkcc.com.hk/journal>

### Recommended Citation

Suet-Ting Lau, Chun-Wai Chiu, Wai-Suen Leung, Kin-Wah Chan, Pilot Community Survey of Cardiovascular Risks  
*Journal of the Hong Kong College of Cardiology* 2001;9(3) <https://doi.org/10.55503/2790-6744.1170>

This Original Article is brought to you for free and open access by Journal of the Hong Kong College of Cardiology. It has been accepted for inclusion in Journal of the Hong Kong College of Cardiology by an authorized editor of Journal of the Hong Kong College of Cardiology.

# Pilot Community Survey of Cardiovascular Risks

SUET-TING LAU, CHUN-WAI CHIU, WAI-SUEN LEUNG, KIN-WAH CHAN, ALBERT CHAN\*

From Department of Medicine and Geriatrics, Department of Pathology\*, Princess Margaret Hospital, Hong Kong

**LAU ET AL.: Pilot Community Survey of Cardiovascular Risks.** *A pilot cardiovascular risk survey and heart health promotion project was conducted for the local community. Demographics and medical history were obtained with a questionnaire. Modifiable risks including smoking, hypertension, diabetes mellitus, hypercholesteraemia, obesity and physical inactivities were assessed. The total cholesterol results of the portable blood monitoring system was compared to the venous sample tested in the hospital laboratory. The need for medical intervention according to the risks was assessed. One hundred and eighty-two subjects volunteered for the survey with 63 males and 119 females. The prevalence of cardiovascular risk factors are high. 47% had BMI greater than 25. 11% were smokers. 6% had blood pressure >160/100 mmHg. 49.4% do not have regular exercise. 9.34% had a spot sugar >11 mmol/l and 62% had total cholesterol >5.2 mmol/l. General advice for lifestyle modification were applicable to 83% of the participants while 46.7% required further medical advice and follow up. The potential for intervention in a population strategy to reduce the cardiovascular risk factors and control the epidemic of cardiovascular disease cannot be neglected. (J HK Coll Cardiol 2001;9:126-132)*

*Cardiovascular risk screening, community health promotion*

## 摘要

在一個社區進行一項心血管危險因素的試點調查和開展一項心臟健康促進計劃。通過調查問卷獲取人口統計學資料及既往史。對可變因素如吸煙、高血壓、糖尿病、高血脂、肥胖及缺乏活動進行了評估。對便攜式血液監測系統所測得的總膽固醇結果與在醫院實驗室採用靜脈血所測定的值進行了比較。對按照危險因素需要藥物干預進行評估。182個自願者中男性63名，女性119名。心血管危險因素比例偏高。BMI大於25者佔47%，吸煙者佔11%，6%血壓高於160/100 mmHg。49.4%沒有規律的體育鍛煉。9.34%偶測血糖大於11 mmol/l，62%總膽固醇水平大於5.2 mmol/l。對其中83%給予生活方式進行一般性指導，46.7%需進一步藥物指導和隨訪。人群干預計劃降低心血管危險因素和控制心血管疾病事件發生的潛力不容忽略。

關鍵詞：心血管危險因素篩查 社區健康發展

---

Address for reprints: Dr. Suet-Ting Lau  
Department of Medicine and Geriatrics, Princess Margaret Hospital,  
Lai Chi Kok, Kowloon, Hong Kong  
Tel: (852) 2990 3581, Fax: (852) 2990 3148

Received December 14, 2000; revision accepted May 3, 2001

## Introduction

Cardiovascular diseases have become the leading cause of death in Hong Kong being second to malignant neoplasms. According to the Hospital Authority Statistical Report, ischaemic heart disease caused 3332 deaths in the year 1998.<sup>1</sup> Cerebral vascular disease with similar underlying risk factors ranked third in the cause for mortality, causing 3297 deaths. While aging and modernisation might be factors contributing to the change,<sup>2</sup> preventive measures in combating the risk factors should benefit our local population.

The survey was conducted by a district hospital which served a local population of about 700 thousand.<sup>3</sup> Besides serving as secondary and tertiary care centre, the hospital would like to promote heart health for the community. The local public healthcare systems would also want to develop cost-effective methods of averting expensive treatment and hospitalizations through a variety of preventive measures.<sup>4</sup> Before instituting structured preventive programme, an assessment of the cardiovascular risk prevalence and its potential implication on health resources would facilitate future planning.

## Objective

This pilot community health promotion project has three objectives. Firstly, a pilot community survey on cardiovascular risk factors most amendable to change,<sup>4</sup> including hypertension, diabetes mellitus, hypercholesteraemia, smoking, obesity and physical activity will be conducted. Secondly, the usage of portable blood monitoring systems in community screening, its efficacy and practicability would be assessed. Thirdly, the resource implication as a consequence to the health screening project need to be done. This could assist in the formulation of planning for control of the cardiovascular risk factors and their consequences in the population.

## Method

During the Health week targeted at community health promotion, cardiovascular risk screening was

conducted at the Exhibition site on two consecutive days. The subjects screened are local inhabitants recruited from local community centres and on-site viewers on voluntary basis.

Recording of demographic data, height and weight measurements were done by trained volunteer workers. Blood pressure measurement, blood testing of glucose and cholesterol using stix digital analysers were assessed by diabetic nurses and community nurses. The nurses were trained prior to the sessions in the usage of the blood monitoring meter (Accu trend GC). The meters are calibrated prior to usage in every session and after 20 consecutive tests. A single random blood pressure was measured with digital blood pressure monitor (ANDUA732). Body mass index (BMI) was calculated according to the formula weight in kilograms/height in meters.<sup>3</sup>

Medical staff from the district hospital conducted the final assessment, venous blood taking for cross-checking, counselling and advice for referral to medical care. On site dietary and lifestyle advice is also available and was conducted by dietitians from the hospital.

Health education exhibition boards and pamphlets were utilized for health promotion and education.

Guidelines for advice and counselling are as in Table 1.

Spot sugar <8 mmol/l was taken as normal, a level between 8 mmol/l and 11 mmol/l was treated as borderline and was advised to have repeated check. If spot sugar is greater than 11 mmol/l, specialist clinic referral was advised.

Spot cholesterol less than 5.2 mmol/l was considered as normal. Borderline level between 5.2 mmol and 6.2 mmol/l was advised to have repeated test. Cholesterol level more than 7 mmol/l was advised to seek medical advice.

Dietitian advice was recommended if blood sugar was greater than 11 mmol/l, cholesterol was greater than 6.2 mmol/l or body mass index (BMI) was more than 30.

Blood pressure is considered normal if  $\leq 140/90$  mmHg. Borderline high blood pressure with systolic 140 mmHg to 160 mmHg and diastolic 90 mmHg to 100 mmHg was advised to have repeated check by the primary care physician. Blood pressure greater than 160 mmHg systole and 100 mmHg diastole was referred to the Specialist Clinic for assessment.

**Table 1. Guidelines for management**

|                |                           |                                                                    |
|----------------|---------------------------|--------------------------------------------------------------------|
| Spot Sugar     | <8 mmol/l                 | Normal                                                             |
|                | >8 ≤ 11 mmol/l            | Advice to FU, primary care for repeat check<br>Give general advice |
|                | >11 mmol/l                | Refer Specialist Clinic<br>See dietitian                           |
| Cholesterol    | <5.2 mmol/l               | Normal                                                             |
|                | >5.2 mmol ≤ 6.2 mmol/l    | Advice to FU primary care for repeat check<br>Give general advice  |
|                | >6.2 ≤ 7 mmol/l           | Advice to FU, primary care for repeat check<br>(see dietitian)     |
|                | >7 mmol/l                 | Refer Specialist Clinic, (see dietitian)                           |
| Overweight     | BMI >25 kg/m <sup>2</sup> | General advice                                                     |
| Obesed         | BMI >30 kg/m <sup>2</sup> | See dietitian                                                      |
| Blood Pressure | ≤140/90 mmHg              | Normal                                                             |
|                | 140-160 mmHg (systolic)   | Advice to FU primary care for repeat check                         |
|                | 90-100 mmHg (diastolic)   | Give general advice                                                |
|                | ≥160/100 mmHg             | Refer specialist clinic, give general advice                       |

## Results

A total of 190 subjects were assessed, 8 were not analysed because of incomplete data. Fifty-seven participants volunteered for venous blood taking of spot sugar and total serum cholesterol level.

Results of screening (Table 2) showed a female preponderance of 119 with 63 males. The age group distribution is shown in Figure 1 with the peak attendance between 65 to 69. The mean height was 153.67 cm. The mean weight was 58.20 kg with a mean body mass index (BMI) of 24.6. Eighty-six (47.25%) had a BMI greater than 25. Eight (4.4%) had a BMI greater than 30 ranging from 30.8 to 36. The mean systolic blood pressure was 129.39 mmHg and the mean diastolic blood pressure was 76.94 mmHg. A single blood pressure was found to be greater than 160/100 mmHg in 11 individuals. Eight had no history of hypertension while 3 had history of hypertension already on treatment 10 had known hypertension already on treatment.

The family history of diabetes mellitus, hypertension, hypercholesteraemia and heart disease are

listed in Table 3. There was a high incidence of family history of hypertension (16.5%) and diabetes mellitus (15.4%).

The past health profile of the subjects are listed in Table 4. The subjects who are known diabetes mellitus or hypercholesteraemia are usually already under treatment while those with hypertension, heart disease or renal disease were not adequately cared for.

The percentage of smoker was 11% and that of regular drinker was 12.6%. About half (50.6%) of the screened subjects had regular exercise, usually in the form of morning exercise. The life style of eating out was very common. 31.3% had eating out more than 7 times per week.

Test for blood glucose showed that 4 (2.2%) had spot hyperglycaemia greater than 11 mmol/l and 3 (7.14%) had spot sugar between 5 mmol to 11 mmol/l. 97 (62%) had hypercholesteraemia of greater than 5.2 mmol/l (Table 5).

The total cholesterol measured by stix method correlates well with the 49 venous samples done in the hospital laboratory as shown by the scatter diagram comparing the cholesterol checked with the stix method

COMMUNITY SURVEY, CARDIOVASCULAR RISKS

**Table 2. Results of screening (1)**

|                   |                                 |
|-------------------|---------------------------------|
| Total Number      | 182                             |
| Male              | 63                              |
| Female            | 119                             |
| Mean Height       | 153.67 cm (11.42)               |
| Mean Weight       | 58.20 kg (9.98)                 |
| Mean BMI          | 24.60 kg/m <sup>2</sup> (15.53) |
| Mean Systolic BP  | 129.39 mmHg (18.53)             |
| Mean Diastolic BP | 76.94 mmHg (9.93)               |
| Mean Glucose      | 5.97 mmol/l (6.75)              |
| Mean Cholesterol  | 5.45 mmol/l (1.0919)            |

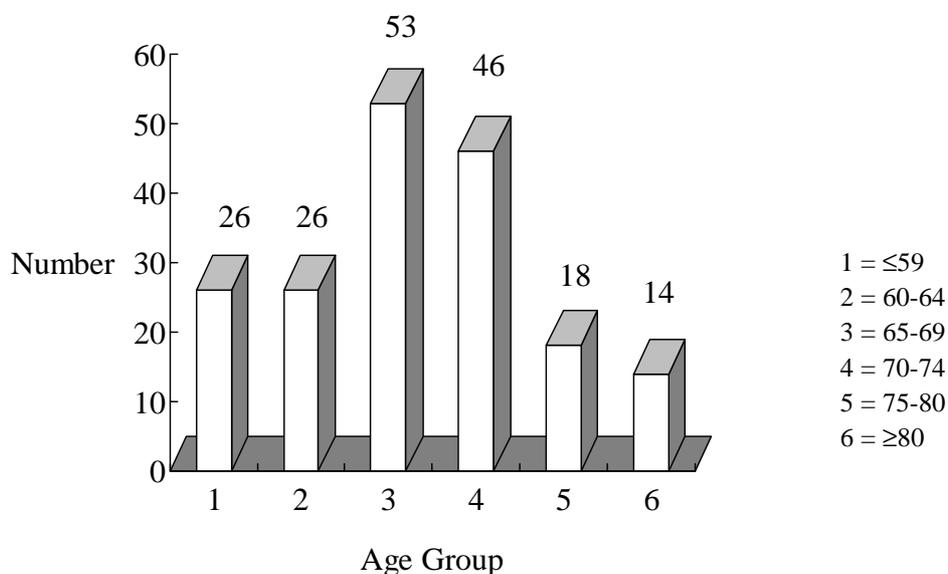
Standard deviation in ( )

**Table 3. Family history of disease**

| Disease             | No. | %    |
|---------------------|-----|------|
| Diabetes Mellitus   | 28  | 15.4 |
| Hypercholesteraemia | 8   | 4.4  |
| Hypertension        | 30  | 16.5 |
| Heart disease       | 10  | 5.5  |

**Table 4. Questionnaire results**

| Conditions               | Number | %    | Number on treatment |
|--------------------------|--------|------|---------------------|
| Diabetes mellitus        | 28     | 15.4 | 23                  |
| Hypercholesteraemia      | 25     | 13.7 | 13                  |
| Hypertension             | 66     | 36.3 | 51                  |
| Heart disease            | 21     | 11.5 | 14                  |
| Renal disease            | 5      | 2.7  | 2                   |
| Current smoker           | 20     | 11.0 |                     |
| Ex-smoker                | 38     | 20.9 |                     |
| Regular drinker          | 23     | 12.6 |                     |
| Ex-drinker               | 19     | 10.4 |                     |
| Regular exercise         | 92     | 50.6 |                     |
| Occasional exercise      | 49     | 26.9 |                     |
| No exercise              | 39     | 21.4 |                     |
| Eating out >7 times/week | 57     | 31.3 |                     |



**Figure 1.** Age group distribution of screened subjects.

**Table 5. Blood test results**

| Stix-test         |                        | No. | %     |
|-------------------|------------------------|-----|-------|
| Glucose           | <8 mmol/l              | 165 | 90.66 |
|                   | >8 ≤ 11 mmol/l         | 13  | 7.14  |
|                   | >11 mmol/l             | 4   | 2.20  |
| Total cholesterol | <5.2 mmol/l            | 59  | 37.82 |
|                   | >5.2 ≤ 6.2 mmol/l      | 57  | 36.54 |
|                   | >6.2 mmol/l ≤ 7 mmol/l | 25  | 16.02 |
|                   | >7 mmol/l              | 15  | 9.62  |

and the hospital laboratory (Figure 2). The 95% confidence interval for the difference between mean from the 2 measurement is -0.69 to -0.14. Total cholesterol by the stix method was lower than the results by the reference laboratory (p=0.007). No significant correlation could be elicited between the different risk factors, family history or past health because of the small sample.

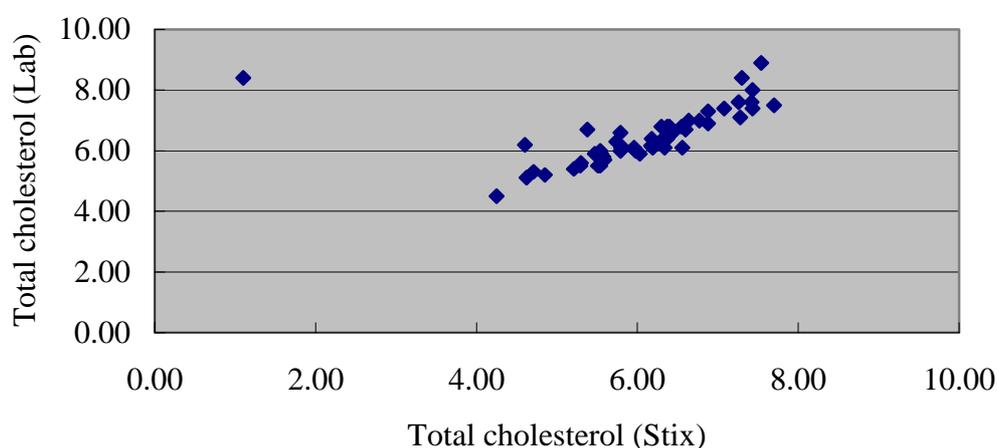
The majority of subjects (151) were given general health advice. One hundred and ten required dietary advice for either hypercholesteraemia, diabetes mellitus or overweight. Sixty were recommended to have follow up by primary care physicians while 25 were recommended to be assessed and followed up in Specialist Clinic (Table 6).

### Limitation of Study

This is a retrospective study of data obtained during a community project. The pilot study consisted of a small biased sample. Many of the female participants come from

**Table 6. Requirement for management**

|                       | No. | %    |
|-----------------------|-----|------|
| General Health Advice | 151 | 82.9 |
| Dietary Advice        | 110 | 60.4 |
| Primary Care          | 60  | 33.0 |
| Specialist OPD        | 25  | 13.7 |



**Figure 2.** Correlation of total cholesterol level between hospital laboratory (PMH-TC) and stix method (TC).

community centres which are dominated by retired and elderly female subjects and is not fully representative of the whole population. However, this could reflect the aggregation of elderly in the locality served by the district hospital. Assessment of questionnaire data by recall may pose inaccuracy and bias.

The total cholesterol assessed by stix method have the limitation of having the range from 3.9 to 7.8 mmol/l by the Accutrend GC blood monitoring system. Too high or too low level could not be determined.

## Discussion

The subjects screened showed a female preponderance which is comparable to other voluntary screening programme.<sup>6,7</sup> The mean body mass index (BMI) is 24.6 which is greater than a mean of 23.5 in study conducted in elderly Chinese in America.<sup>6</sup> The mean cholesterol of 5.45 mmol/l is slightly lower than similar age group (5.46 mmol).

Although the meter has been validated and the stix method results compared favourably with the laboratory test, use of portable analyzer, stix test should be interpreted with caution. The stix method tends to under-estimate the level but it was at most with the confidence interval -0.69 to 0.14 and is acceptable for a screening test. Further assessment with repeated venous blood testing is required for diagnosis and management of the screened high risk patients.<sup>8,9</sup>

The purpose of the health screening and promotion project is not targeted for case detection. The number of newly detected high blood pressure (8) and hyperglycaemic (5) individuals was low. Many of the elderly participants already had a known history of diabetes (28) and hypertension (66). However, screening confirmation of previously diagnosed individual appeared to have a positive impact on these individual.<sup>10</sup> Although they have a known medical history, many of them were not treated or adequately cared for.

The incidence of other cardiovascular risk factors is high. A large proportion was overweight 86 (47%) and hypercholesteraemic 97 (62%) which required dietary and healthy lifestyle education.<sup>11,12</sup> About half of the participants had regular exercise, the exercise habits should be encouraged in the other half with

inadequate physical activity.

Healthy eating patterns have to be promoted to the whole population.<sup>13</sup> Since eating out is very common in our local population, the food choices of eating out have to be emphasized in the education programme. Otherwise, it would not be practicable to a large proportion of our population.

It is reflected in the intervention protocol of this screening and education programme for heart health that the local population had modifiable risk factors that could benefit from general health advice and dietary advice. In order that preventive measures including counselling, monitoring and appropriate treatment of hypertension, diabetes mellitus and hyperlipidaemia are instituted, it would require effective follow up and monitoring up to 46.7% of the population by medical services. The primary care practice should be responsible for management of these patients.

## Conclusion

Community screening of cardiovascular risks revealed that the prevalence of risk factors whose control reduces cardiovascular diseases are high in our local population. General health education and dietary education of the public should be instituted to lower the risks. The cessation of smoking, increase physical activity and weight reduction are components of education besides lowering the dietary fat and cholesterol level.<sup>14-16</sup> The risk factors that can be screened for in the context of a routine history, physical examination and laboratory assessment should be targeted at high risk individuals. The community wide screening using simple questionnaire, anthropometric measurements and portable analyzer could be utilized in health promotion projects. The screening and education should also aim at the younger population e.g. at worksites and schools to be cost-effective for primary prevention. Aggressive lifestyle risk factor modification in the identified high risk populations with adequate blood pressure control and lipid lowering therapy is warranted.<sup>17,18</sup>

The co-operation of primary care physician and secondary or tertiary care specialist are needed in prevention of cardiovascular diseases and promotion of a healthier life for our local population.

## Acknowledgement

The work of the volunteers including number of the Purple Angel and professional staff of the Princess Margaret Hospital was very much appreciated.

## References

1. Hospital Authority Hong Kong. Hong Kong Hospital Authority Statistical Report 98/99.
2. Woo KS, Vallance-Owen J. A perspective of cardiovascular diseases in Hong Kong in the 1990's. *Chin Med J* 1988;40-2.
3. WG OP Paper No.12/92 of the Working Group on Population Distribution Hong Kong, 1992.
4. Tower EC, Ballin S. Prevention in health care reform. *Circulation* 1994;90:2189-91.
5. Elliott WJ. Cardiovascular risk factors, which ones can and should be remedied? *Postgrad Med* 1994;96:49-61.
6. Choi ES, McGandy RB, Dallal GE, et al. The prevalence of cardiovascular risk factors among elderly Chinese Americans. *Arch Intern Med* 1990;150:413-8.
7. Fong PS, Tam SC, Tai YT, et al. Serum lipid and apolipoprotein distribution in Hong Kong Chinese. *J Epidemiol Community Health* 1994;48:355-9.
8. Havas S, Bishop P, Koumjian L, et al. Reflotron performance in a community screening program: results of the Massachusetts Model Systems for blood cholesterol screening project. *Am J Prev Med* 1991;7:397-405.
9. Bachorik PS, Rock R, Cloey T, et al. Cholesterol screening: comparative evaluation of on-site and laboratory-based measurements. *Clin Chem* 1990;36:255-60.
10. Maiman LA, Greedland P. Public cholesterol screening in the previously diagnosed: misuse of resources or beneficial function? *Am J Prev Med* 1994;10:20-5.
11. Leighton RF, Repka FJ, Birk TJ, et al. The Toledo exercise and diet study. Results at 26 weeks. *Arch Intern Med* 1990;150:1016-20.
12. Morris JN, Clayton DG, Everitt MG, et al. Exercise in leisure time: coronary attack and death rates. *Br Heart J* 1990;63:325-34.
13. National Institute of Health, US Dept of Health and Human Services. National Cholesterol Education Program. Expert panel on population strategies for blood cholesterol reduction. *Arch Intern Med* 1991;151:1071-84.
14. Expert panel on detection, evaluation and treatment of high blood cholesterol in adults. *JAMA* 1993;269:3015-223.
15. Poulter N, Sever P, Thom S, et al. Cardiovascular disease, risk factors and intervention. Oxford, Radcliffe Medical Press, pp. 85.
16. Frolkis JP. Screening for Cardiovascular disease, concepts, conflicts and consensus. *Med Clinics of North America* 1999; 83:1339-66.
17. Becker DM, Yook RM, Moy TF, et al. Markedly high prevalence of coronary risk factors in apparently healthy African-American And white siblings of persons with premature coronary heart disease. *Am J Cardiol* 1998;82:1046-51.
18. Genest Jr J, Colin JS. Clustering of cardiovascular risk factors: targeting high risk individuals. *Am J Cardiol* 1995; 76:8A-17A.