

# Public lacks knowledge on chronic kidney disease: telephone survey

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## ABSTRACT

**Objectives:** To examine knowledge of chronic kidney disease in the general public.

**Design:** Cross-sectional telephone survey.

**Setting:** Hong Kong.

**Participants:** Community-dwelling adults who spoke Chinese in Hong Kong.

**Results:** The response rate was 47.3% (516/1091) out of all subjects who were eligible to participate. The final survey population included 516 adults (55.6% female), of whom over 80% had received a secondary level of education or higher. Close to 20% of the participants self-reported a diagnosis of hypertension. Few (17.8%) realised the asymptomatic nature of chronic kidney disease. Less than half of these individuals identified hypertension (43.8%) or diabetes (44.0%) as risk factors of kidney disease. Awareness of high dietary sodium as a risk factor for chronic kidney disease was high (79.5%).

**Conclusions:** The public in Hong Kong is poorly informed about chronic kidney disease, with major knowledge gaps regarding the influence of hypertension on kidney disease. We are concerned about the public's unawareness of hypertension being a risk factor for kidney disease. Future health education should target areas of knowledge deficits.

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### New knowledge added by this study

- Despite the wealth of evidence for hypertension being a risk factor of chronic kidney disease, less than half the general public in Hong Kong are aware of the association.
- Only 17.8% of respondents in a telephone survey recognised the asymptomatic nature of chronic kidney disease.

### Implications for clinical practice or policy

- There is an urgent need for better public education focused on risk factors of chronic kidney disease, so as to improve the chance of opportunistic screening for kidney disease.

## Introduction

Several recent surveys have documented low levels of knowledge about chronic kidney disease among patients.<sup>1–3</sup> In a US survey of almost 400 patients at all stages of chronic kidney disease not on dialysis,<sup>1</sup> more than half reported no or little knowledge about the symptoms of kidney disease, or medications that can be harmful to the kidney. Furthermore, awareness of chronic kidney disease in the community is low, and limited knowledge about this disorder in the general public poses an even more significant hurdle in disease prevention. A large representative sample of Chinese adults yielded a 10.8% prevalence of chronic kidney disease, whereas only 12.5% of them were aware they had this condition.<sup>4</sup>

Data on general public knowledge on chronic kidney disease are essential to understanding knowledge gaps and formulating education

programmes. Without knowing knowledge gaps, public health education programmes cannot be planned in a strategic manner. To examine knowledge on kidney disease and identify areas of misconception in the general population, we conducted a cross-sectional telephone survey in Hong Kong. We anticipated that assessment of knowledge gaps would be important to improve the public education and has the potential of preventing chronic kidney disease.<sup>5</sup>

## Methods

Between 4 and 7 March 2013, we carried out a telephone survey of adults in Hong Kong. Respondents were required to be adults aged 18 years or older, and to speak Cantonese or Mandarin. The sampling method entailed selecting telephone numbers randomly from the latest Hong Kong

## 市民缺乏對慢性腎病的認識：電話調查研究

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目的：探討一般市民對於慢性腎病的認識。

設計：橫斷面電話調查。

安排：香港。

參與者：香港懂華語的成年人。

結果：嘗試接觸的1091人中，516人願意參與電話調查訪問，反應率為47.3%。參與調查的516名成人中，55.6%為女性，其中超過八成曾接受中學或以上的教育。接近兩成的被訪者透露有高血壓。少數人（17.8%）知悉慢性腎病可以是毫無症狀的；其中不到一半的人士確認高血壓（43.8%）和糖尿病（44.0%）為腎病的危險因素。大部分受訪人士（79.5%）知道高鈉飲食是慢性腎病的其中一項危險因素。

結論：香港市民對慢性腎病的認識不足，他們未能知悉高血壓對腎病的影響。我們所關注的是市民大眾未能認識到高血壓是腎病的一項危險因素。未來的健康教育應針對這方面的知識。

Residential Telephone Directories (both Chinese and English versions) as seed numbers. In order to include unpublished telephone numbers, the last two digits of the selected seed numbers were replaced by two new and random digits generated by computer. When telephone contact was established successfully with a target household, only a person aged 18 years or more was chosen for an interview. When there was more than one eligible subject in the household, only one was chosen for the survey (by convenience).

As a result, a total of 11 600 telephone calls were made, and 2659 families were successfully contacted. Ineligible contacts included invalid lines, non-residential lines, voice machines, facsimile numbers, and language problems. Of those successfully connected, 1383 cut the line before confirmation, 562 targeted persons refused the interview, 185 families had no eligible participant, and 13 were not interviewed because the target participants were not available. Finally, a total of 516 respondents were successfully interviewed, yielding a response rate of 47.3% (out of the 1091 eligible families contacted).

Trained interviewers from Hong Kong Institute of Asia-Pacific Studies administered the survey by telephone, and each interview lasted 10 minutes. Participants were asked close-ended questions on general knowledge about chronic kidney disease. The survey domains and instrument were developed to assess knowledge of the respondents on the general function of the kidneys, causes and symptoms of chronic kidney disease, and management and treatment of kidney disease. Some of the multiple-choice questions were refined

and modified from a questionnaire previously tested in Singapore.<sup>2</sup> Pre-testing of the questionnaire was carried out on members of the public through focus group discussions. The questionnaire was tested for face validity as well as content saturation. The finalised questionnaire was administered to

TABLE 1. Baseline demographic characteristics

Characteristic	No. (%) of participants (n=516)
Women	287 (55.6)
Age group (years)	
18-29	90 (17.4)
30-39	72 (14.0)
40-49	95 (18.4)
50-59	126 (24.4)
≥60	131 (25.4)
Refused to answer	2 (0.4)
Education level	
Lower than kindergarten	14 (2.7)
Primary school	76 (14.7)
1-3 Years in secondary school	85 (16.5)
4-7 Years in secondary school	157 (30.4)
Tertiary education without degree	56 (10.9)
Tertiary education with degree or above	124 (24.0)
Refused to answer	4 (0.8)
Personal history of medical condition*	
Diabetes mellitus	35 (6.8)
Hypertension	98 (19.0)
Hyperlipidaemia	67 (13.0)
Chronic kidney disease	19 (3.7)
Cardiac disease	19 (3.7)
Cerebrovascular disease	8 (1.6)
None of the above	323 (62.6)
Unable to answer	31 (6.0)
Refused to answer	2 (0.4)
Family history (first-degree relatives) of medical condition*	
Diabetes mellitus	150 (29.1)
Hypertension	221 (42.8)
Hyperlipidaemia	84 (16.3)
Chronic kidney disease	49 (9.5)
Cardiac disease	68 (13.2)
Cerebrovascular disease	71 (13.8)
None of the above	178 (34.5)
Unable to answer	28 (5.4)
Refused to answer	2 (0.4)

\* The percentages do not total 100% because more than one answer was permitted

patients at primary care public medical centres in persons with no known chronic kidney disease.<sup>2</sup> We also collected demographic information (age, sex, education level, and self-reported health conditions) from the respondents.

Statistical analyses were performed using the Statistical Package for the Social Sciences (Windows version 16.0; SPSS Inc, Chicago [IL], US). Numerical data were expressed as mean ± standard deviation. Percentages were compared by means of Fisher's exact test or Chi squared test. A two-tailed P value of <0.05 was regarded as statistically significant.

## Results

Table 1 lists the characteristics of the respondents, who had a median age of 50 years. Over 80% of them had received a secondary or higher level of education. Only 3.7% (n=19) of the respondents were aware of any personal history of chronic kidney disease, and 19.0% (n=98) admitted they had hypertension. A family history of hypertension and diabetes was reported in 42.8% and 29.1% of the respondents, respectively.

Table 2 lists the answers to questions on the function of the kidneys and general knowledge on kidney disease. Only 27.9% of the respondents knew that only one kidney is needed for a human being to lead a normal life, although most (84.7%) were aware of the kidney's function. Most respondents (79.5%) listed high dietary sodium as a risk factor for chronic kidney disease, but hypertension and diabetes were selected less frequently. Less than half of the respondents knew that hypertension (43.8%) and diabetes (44.0%) can cause kidney disease, but 52.7% answered that frothy urine can be an early manifestation of kidney disease. However, only 17.8% correctly identified the asymptomatic nature of chronic kidney disease.

We further analysed factors that are associated with a lack of knowledge that hypertension can cause chronic kidney disease. There were no significant differences between groups in terms of age and gender. On the other hand, respondents with higher levels of education were more likely to self-report a personal or family history of hypertension and a personal history of diabetes mellitus (Table 3), and were more likely to know that hypertension is a cause of kidney disease. Similarly, a higher education level and a personal history of diabetes mellitus were associated with better knowledge about the causal relationship between diabetes and chronic kidney disease (Table 4).

Table 5 shows the perceived sequelae of chronic kidney disease. Overall, more than 80% of respondents said that kidney disease could be prevented, and could be controlled by medication. On the other hand, over 60% of them did not identify hypertension as a complication of chronic kidney

TABLE 2. Respondents' general knowledge and perception on kidneys, causes of kidney diseases, and symptoms that might progress to kidney failure

Questions	No. (%) of participants (n=516)
No. of healthy kidney(s) needed to lead a normal life	
1	144 (27.9)
2	316 (61.2)
3	1 (0.2)
4	2 (0.4)
5	1 (0.2)
Do not know	52 (10.1)
Function of kidney*	
To break down food	32 (6.2)
To produce substances that break down fats	38 (7.4)
To filter waste products in the blood	437 (84.7)
Others	3 (0.6)
Do not know	33 (6.4)
Perceived cause(s) of chronic kidney disease*	
Drinking alcohol	272 (52.7)
Inadequate sleep	239 (46.3)
Taking too much salt	410 (79.5)
High blood pressure	226 (43.8)
Diabetes	227 (44.0)
Inherited condition	221 (42.8)
Others	6 (1.2)
Do not know	14 (2.7)
Perceived symptom(s) of early kidney disease that might progress to kidney failure*	
Bubbles in the urine	272 (52.7)
Yellow urine	209 (40.5)
Frequent thirst	211 (40.9)
Back pain	273 (52.9)
Blood in the urine	257 (49.8)
Yellow eyes	116 (22.5)
Without symptoms or complaints	92 (17.8)
Others	8 (1.6)
Do not know	52 (10.1)

\* The percentages do not total 100% because more than one answer was permitted

disease. Furthermore, nearly half (43.6%) of the subjects did not know the importance of checking the blood pressure in patients with chronic kidney disease, and less than a quarter (22.5%) believed that chronic kidney disease can increase the risk of atherosclerosis.

TABLE 3. Factors associated with the respondents' knowledge that hypertension can cause chronic kidney disease

Factors	No. (%)		P value
	Participants who answered correctly (n=226)	Participants who answered incorrectly (n=290)	
Women	127 (56.2)	160 (55.2)	0.54
Age group (years)*			0.68
18-29	35 (38.9)	55 (61.1)	
30-39	32 (44.4)	40 (55.6)	
40-49	41 (43.2)	54 (56.8)	
50-59	63 (50.0)	63 (50.0)	
≥60	54 (41.2)	77 (58.8)	
Refused to answer	1 (50.0)	1 (50.0)	
Education level*			0.031
Lower than kindergarten	5 (35.7)	9 (64.3)	
Primary school	26 (34.2)	50 (65.8)	
1-3 Years in secondary school	33 (38.8)	52 (61.2)	
4-7 Years in secondary school	66 (42.0)	91 (58.0)	
Tertiary education without degree	25 (44.6)	31 (55.4)	
Tertiary education with degree or above	67 (54.0)	57 (46.0)	
Refused to answer	4 (100.0)	0	
Self-reported history of hypertension	51 (22.6)	47 (16.2)	0.042
Self-reported history of diabetes mellitus	25 (11.1)	10 (3.4)	0.001
Family history of hypertension	111 (49.1)	110 (37.9)	0.004
Family history of diabetes mellitus	73 (32.3)	77 (26.6)	0.096

\* The percentages refer to the row percentages

TABLE 4. Factors associated with the respondents' knowledge that diabetes mellitus can cause chronic kidney disease

Factors	No. (%)		P value
	Participants who answered correctly (n=227)	Participants who answered incorrectly (n=289)	
Women	130 (57.3)	157 (54.3)	0.53
Age group (years)*			0.022
18-29	41 (45.6)	49 (54.4)	
30-39	21 (29.2)	51 (70.8)	
40-49	54 (56.8)	41 (43.2)	
50-59	55 (43.7)	71 (56.3)	
≥60	55 (42.0)	76 (58.0)	
Refused to answer	1 (50.0)	1 (50.0)	
Education level*			0.045
Lower than kindergarten	5 (35.7)	9 (64.3)	
Primary school	24 (31.6)	52 (68.4)	
1-3 Years in secondary school	31 (36.5)	54 (63.5)	
4-7 Years in secondary school	72 (45.9)	85 (54.1)	
Tertiary education without degree	27 (48.2)	29 (51.8)	
Tertiary education with degree or above	65 (52.4)	59 (47.6)	
Refused to answer	3 (75.0)	1 (25.0)	
Self-reported history of hypertension	49 (21.6)	49 (17.0)	0.21
Self-reported history of diabetes mellitus	29 (12.8)	6 (2.1)	<0.001
Family history of hypertension	104 (45.8)	117 (40.5)	0.24
Family history of diabetes mellitus	74 (32.6)	76 (26.3)	0.12

\* The percentages refer to the row percentages

TABLE 5. Questions on the care of kidney disease

Questions	No. (%) of participants (n=516)
Chronic kidney disease can be prevented	
Agree	455 (88.2)
Disagree	39 (7.6)
Do not know	22 (4.3)
Chronic kidney disease can be controlled by medication	
Agree	454 (88.0)
Disagree	35 (6.8)
Do not know	27 (5.2)
Chronic kidney disease can cause the following condition(s)*	
Kidney stone	268 (51.9)
High blood pressure	196 (38.0)
High lipid level	131 (25.4)
Diabetes	207 (40.1)
Atherosclerosis	116 (22.5)
Others	9 (1.7)
Do not know	68 (13.2)
Patients with chronic kidney disease should pay attention to*	
Urine test	372 (72.1)
Blood sugar test	259 (50.2)
Blood lipid test	206 (39.9)
Blood pressure measurement	291 (56.4)
Others	3 (0.6)
Do not know	41 (7.9)

\* The percentages do not total 100% because more than one answer was permitted

## Discussion

The main findings from this survey define the key knowledge gaps concerning the kidney disease. In particular, the public in Hong Kong is unfamiliar with the relationship between hypertension and kidney disease. Almost four in five knew that high dietary sodium intake can be associated with kidney disease, but the risk of hypertension causing kidney disease was underestimated. Only 43.8% of respondents considered hypertension as a factor that increases the risk of kidney disease, and 43.6% did not perceive the need for patients with kidney disease to have blood pressure monitored. Another key issue was that close to 20% of the respondents self-reported a diagnosis of hypertension. Quantifying such knowledge deficit indicates that high blood pressure is relatively neglected and provides useful input for future public education.

Low public awareness of hypertension as a

cause of kidney damage has been demonstrated in other national surveys. A cross-sectional survey of 1435 primary care patients without kidney disease in Singapore reported that only 51.2% knew that chronic kidney disease could be caused by diabetes, hypertension, and hereditary conditions.<sup>2</sup> Overall, the public remains relatively unaware of the two leading causes of chronic kidney disease (hypertension and diabetes) in all developed and many developing countries. Similar to hypertension, the rising worldwide prevalence of diabetes and the lack of knowledge about its relationship with chronic kidney disease are of great concern.<sup>6</sup> The AusDiab study involving a survey of 852 Australian subjects from the general population found an even lower level of understanding of hypertension; 25.7% of respondents reported poor diet as a cause of kidney disease but only 2.8% identified hypertension as risk factor.<sup>7</sup> According to a cross-sectional survey of 2017 African Americans, 12.1% knew that having hypertension was a risk factor for kidney disease.<sup>8</sup> A strikingly prevailing theme among all these surveys (including ours) was the tendency of the public to name aspects of lifestyle instead of medical conditions as risk factors for kidney disease. In other words, there is relatively higher awareness of dietary risk factors for kidney disease compared with high-risk medical condition, notably hypertension. This was affirmed in a community-based qualitative exploratory analysis on kidney disease knowledge among rural populations in the US.<sup>9</sup> Analysis of the audiotape scripts identified a representative theme: lifestyle choices, such as drinking sodas and diet, were routinely brought up as a means to explain the occurrence of kidney disease.<sup>9</sup>

More accurate and prioritised knowledge of kidney disease risk factors will lead to better disease awareness and increase chances of opportunistic screening. It is of concern that the general public underestimates the importance of blood pressure control. The most recent Global Burden of Disease Study launched by the World Bank and the World Health Organization announced that high blood pressure has shifted from the fourth to the top risk factor in terms of the global disability-adjusted life-years.<sup>10</sup> Inability to consider hypertension as the risk factor for kidney disease implies that many subjects perceive themselves at lower risk of kidney disease, do not get screened, and have less concern for certain health behaviours. In fact, insufficient knowledge can drive the problem of antihypertensive medication non-adherence, which has recently been confirmed to confer an increased risk of end-stage renal disease. Using the Canadian health insurance databases of 185 476 patients with hypertension, among those who were in possession of their prescribed medication, more than 80% of the time had a 33% lower risk of end-stage renal disease.<sup>11</sup>



Targeting health care professionals is probably not the utmost concern, because only 3.4% of primary care physicians failed to recognise hypertension as a risk factor for chronic kidney disease according to a cross-sectional representative survey of primary care providers in the community.<sup>12</sup> On the other hand, targeting public education to prevent asymptomatic renal disease should be explored. We have previously confirmed a high frequency of abnormal blood pressure readings and subclinical urinalysis abnormalities (17.4%) in a screening programme of 1201 apparently healthy community-dwelling adults in Hong Kong.<sup>13</sup> A successful public educational programme should therefore aim at better informing the asymptomatic nature of early chronic kidney disease, and address the risk factors such as hypertension. For this reason, the role of hypertension in kidney disease was chosen as the key message for World Kidney Day 2009.<sup>14</sup>

One important limitation of our survey was that individual-level data of subjects who declined the interview were missing. The fact that we could not compare the baseline characteristics of participants and those who declined raises the possibility of response bias. Response bias implies that the small percentage of subjects who responded could have differed systematically from the majority who did not answer telephone calls or cut the line before confirmation. Moreover, the sample of respondents in this residential telephone registry may not be generalised to other populations, such as those who mostly use mobile phones. Thus, requirement of a landline telephone in order to be sampled by the current random digit-dial telephone survey raised the possibility of non-coverage bias. Furthermore, our survey tool was not developed through experts in health literacy and psychometric analyses, and the questions were not field-tested and validated. We are aware of better constructed chronic kidney disease-specific knowledge survey tools in other populations with known kidney disease.<sup>15</sup> Future research to assess kidney disease knowledge in the Chinese community should follow similar developments to improve the reliability and validity of questionnaires. In addition, the diagnosis of hypertension and chronic kidney disease in our telephone survey respondents was not validated, instead it was based entirely on self-reporting.

## Conclusions

The general public in Hong Kong did not recognise that the kidney is both a cause and victim of hypertension. Public health education efforts that target knowledge of kidney disease risk factors may help reduce the burden of kidney disease.

## Declaration

No conflicts of interest were declared by authors.

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