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Hepatitis A in a Chinese Urban Population: The Spectrum of Social and Behavioural Risk Factors

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Background. Viral hepatitis is a major public health problem in China. Hepatitis A infections represent a substantial proportion of these, particularly in urban centres. Little is known about the social and behavioural factors in the urban household environment that influence the transmission of hepatitis A.

Methods. We conducted a register-based case-control study to investigate the risk factor patterns for hepatitis A in the general population of the City of Wuhan, in the PR China. Cases were selected from district-based health registers. One control, matched for sex and age, was identified from the case's neighbourhood. Home-based interviews combined with household observation were performed to obtain information on social, behavioural and economic risk factors and the household's indoor and outdoor environment. Analysis included conditional logistic regression.

Results. Hepatitis A infection was associated with a variety of social and household-related factors, like handwashing habits (after working in the garden: adjusted odds ratio [OR] = 8.24, 95% confidence interval [CI] : 1.5–44.2, before food preparation: OR = 4.68, 95% CI : 1.8–12.0; before eating: OR = 4.92, 95% CI : 1.5–15.7), and the source of fresh vegetables (OR = 3.90, 95% CI : 1.6–9.8). Hygiene in the kitchen and the household surroundings and the disposal of children's stools in vegetable gardens or refuse pits were significantly associated in the univariate analysis only. The lack of possession of luxury consumer items as a surrogate indicator for income was significantly associated with the disease (OR = 2.47, 95% CI : 1.0–6.1). The study clearly established that exposure to health and hygiene education was less in the group of hepatitis A cases when compared to healthy controls (OR = 2.80, 95% CI : 0.9–8.3).

Conclusion. The results of this study underline how social and behavioural factors are important determinants for hepatitis A in urban Chinese populations. These issues could be addressed by appropriate health and hygiene education targeted at high risk groups, and by strengthening existing procedures for monitoring and control of food hygiene.

Keywords: hepatitis A, social, behavioural risk factors, health education, urban, nightsoil, China

Viral hepatitis is among the most important public health problems in China.[1] The incidence rates for viral hepatitis range from 110 to 300/100 000 in cross-sectional and population-based studies,[2,3] with hepatitis A infections accounting for more than a quarter of the morbidity in those aged under 20 years,[2] in children and young adults,[4] and in adults.[5] The true incidence of hepatitis A may, however, be four to five times higher than the number of notifications,[6] owing mainly to the frequency of subclinical disease. Two independent studies from rural China confirm that more than 70% of the infections are either subclinical or inapparent.[7,8] This situation is not well documented in urban areas, but could be assessed since well established health services and notification systems exist in developed Chinese urban centres.[9]

Studies among Chinese populations in Hong Kong,[10] Guangzhou,[4] Xian,[11] Beijing,[5] Huangzhou,[12] Jinan[7] and Shanghai[3] indicate that 26.4% to 89.2% of patients with acute viral hepatitis have hepatitis A infections. A sero-epidemiological study in Hong Kong focusing on young adults reported prevalences of anti-hepatitis A virus antibody in healthy subjects of 24% in those below the age of 30, of 9% of those below 20 and of 89.2% of those above 30 years.[10] Similar rates were found in urban children in Guangzhou[4] (20.8%) and in 20 year olds (30%) in Bangkok in neighbouring Thailand.[13] Although the prevalence of hepatitis A is high in China, factors affecting the disease have been investigated extensively only in the context of epidemics,[14–16] including a major shellfish-associated epidemic in Shanghai in 1988.[3,17,18] These reports highlighted the importance of classical risk factors for transmission of the virus, particularly

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the intake of contaminated food and drinking water and a broad spectrum of person-to-person contacts.

The association between socioeconomic status and health is well known, and most studies of this relationship have shown that poor socioeconomic conditions increase the risk of disease and that their improvement, combined with higher standards of hygiene and sanitation, has decreased the overall endemicity of hepatitis A virus infection worldwide.[6,19] However, the social and environmental factors at household level that affect the disease in endemic conditions have only rarely been investigated,[20] and little attention has been paid to the possible role of latent behavioural factors.

Within the context of the Nightsoil Management Improvement Study which has been undertaken by the UNDP/World Bank Water and Sanitation Programme in collaboration with the International Reference Centre for Waste Disposal (Dübendorf, Switzerland) and the World Bank funded Hubei Urban Environmental Project, the issue of communicable diseases, particularly hepatitis A, was raised. Consequently, we undertook a register-based case-control study in Wuhan, a major industrialized Chinese city, to investigate to what extent various social, demographic and behavioural factors are important risk factors for hepatitis A.

SUBJECTS AND METHODS

Study Area

Wuhan City, the capital of Hubei Province, is one of the biggest industrial cities along the Yangtse River. The city, with a population of 3.8 million, consists of seven urban and two peri-urban districts, and spreads over a total of 8000 km^2 with an inner city area of about 200 km^2. The economy of the area depends mainly on heavy industry. A wide range of urban and peri-urban agriculture provides a living for approximately 600 000 vegetable and rice farmers who supply most of the city's demand for daily perishable produce. The extensive reuse of human waste in urban farming, a traditional Chinese practice for fertilizing crops,[21] provides an income for those involved in the collection and transportation of the estimated 5000 tons of the city's daily nightsoil production.[22] The reuse of nightsoil as fertilizer in urban agriculture poses a potential health risk if the collected human waste illegally bypasses treatment and is applied untreated on to the crops. The extent of use of untreated nightsoil was not known.

Routine health data surveillance is done by well established district-based anti-epidemic stations, who compile health statistics from disease registers which are received weekly from the district's peripheral private and governmental health institutions. For this study, a preliminary review of the morbidity statistics for 1993 indicated a yearly morbidity rate for viral hepatitis of 244/100 000 for the city; monthly statistics showed low transmission in the first quarter of the year.[22] No epidemic was reported from the district-based anti-epidemic stations during the whole study period.

Study Design and Sampling

A matched case-control study was undertaken among 100 cases of hepatitis A and an equal number of healthy subjects from the general population of the city. During the fieldwork from April to August 1994 a total of 200 home-based interviews were completed. A sample of hepatitis A cases that occurred in the period January–April 1994 was randomly drawn from the health statistics registers of the anti-epidemic stations of two districts of the city. Sampling was done proportionate to the population size of the districts to be representative of the general urban population. Because of the large distances within Wuhan City, two districts were selected among those with a high hepatitis morbidity conveniently situated nearest to the research institution. The diagnosis of hepatitis A was taken from the official district health registers. These record a case of hepatitis A if serological examination indicates an increase in alanine aminotransferase (ALT) and anti-hepatitis A virus (anti-HAV) IgM and the patient has suffered from an icterus with general symptoms of hepatitis A or had a history of contact with a hepatitis patient.

Controls were selected from the neighbourhood of the case; the adjacent houses on the same side of the street were approached from the same direction as the case household and checked in turn until a person was found of the same sex and age (within 1 year) as the case. Control subjects needed to be healthy, without a recollection of having had hepatitis and currently free of disease-specific symptoms. Households with members that had any family relationship to the corresponding case were excluded. Verbal informed consent was sought from the participant, or the guardian in the case of children, after the purpose of the study had been explained. No one refused to participate. The study was approved by the Hubei Academy of Medical Sciences of Wuhan City.

Identification of Factors Associated with Hepatitis A

A standardized, structured questionnaire was administered in Chinese by three interviewers at the homes of those recruited for the study. Interviewers were kept blind with regard to disease status of the person they had to visit. For children below 10 years, the closest caretaker was interviewed. Information was collected

TABLE 1 *Potential risk factors for hepatitis A investigated in urban and peri-urban Wuhan City, PR China*

Household Environment
Proximity of the household to livestock, vegetable garden, pond, river
Duration of residence in the area
Total number of rooms
Surface area of the household
Use of private or public latrine
Income in the previous month
Observation checklist on:
General condition of the household: presence of animals and pets, uncovered food visible in any room
Cleanliness of the kitchen: presence of food on the floor, unwashed dishes, plates, pots and utensils (recorded outside eating times only)
Presence of animals from the garden/field in the kitchen
Presence of flies in the kitchen
Cleanliness of the outside household environment; garbage heaps and excrement visible
Family Background
Educational and occupational pattern (for children) of both parents
Total number of people by sex and age living in the household
Family ownership of selected luxury consumer items (TV, phone, washing machine, motorcycle, car, bike)
Perceived problems with flies in the household
Habits of eating out, eating streetfood or leftover food
Health and Hygiene Behaviour and Habits
Exposure to health education
Specific knowledge of hepatitis
Current health status of the family as perceived
Consumption and source of drinking water and food preferences
Habits of handwashing in relation to work in the garden/field, food preparation and defaecation
Defaecation habits at home and away from home
Parent's habit of disposal of children's faeces as fertilizer in the vegetable garden or in the refuse pit
Playing and working in an area potentially contaminated with nightsoil

on demographic and socioeconomic factors, health and hygiene-related behaviours and habits, health education exposure, water and food consumption, and factors relating to the household environment (Table 1).

The questionnaire was complemented with a checklist of observational data to record (i) outside the house; the immediate household environment and the proximity to open water bodies, and (ii) the condition and cleanliness of the household and the kitchen according to pre-defined indicators for cleanliness (Table 1). Both for performing the interviews and recording observational data, the interviewers were trained individually and in groups, and were randomly accompanied by a supervisor to maximize standardization.

Statistical Methods

Data from the questionnaires were double entered and processed using standard database packages (Epiinfo, dBase). Univariate analysis, using the Epiinfo package, generated crude odds ratios (OR) and 95% confidence intervals (CI) as a measure of estimated health risk. The strength of the association was tested using χ^2 tests. The statistical package Egret was used for multivariate analysis of factors that were significantly associated with the disease in the univariate analysis. Conditional logistic regression was performed to construct parsimonious models that included only those factors that remained significant in the presence of the other factors.

RESULTS

Cases and Controls

A total of 100 cases with hepatitis A and an equivalent number of healthy controls were recruited. No substantial imbalances of socio-demographic factors for cases and controls were observed (Table 2). Overall, more male participants were selected compared to females (70% versus 30%; χ^2 $P < 0.0001$). The age structure was normally distributed with 56.5% of the participants aged 11–30 years. Children under the age of 10 represented 17% of the sample.

Educational level of the respondents was generally high, both in cases and controls with approximately 40% of both groups having middle and high-school level education. The sample included a high proportion of university students (35.7% cases, 40.4% controls; χ^2 $P = 0.45$).

TABLE 2 *Per cent distribution of cases and controls according to sex, age, occupation and education in Wuhan City, PR China*

	Cases (N = 100)	Controls (N = 100)	Total (N = 200)
Sex			
Male	70	70	70.0
Female	30	30	30.0
Age			
<10	17	17	17.0
11–20	26	24	25.0
21–30	30	33	31.5
31–40	13	12	12.5
41+	14	14	14.0
Occupation			
Government staff	26	30	28.0
Industrial/factory worker	20	20	20.0
Agricultural worker	6	9	7.5
Food seller/restaurant worker	3	2	2.5
Student	32	31	31.5
Others	13	8	10.5
Education[a]			
No formal schooling	9	10	9.6
Primary	15	12	13.7
Middle	16	15	15.8
High	23	22	22.8
University	35	40	38.1

[a] Missing data: N = 3

The majority of the study subjects or their guardians (79.5%) were attached to government institutions, as government staff, factory workers and students. Urban farmers, fishermen and environmental workers represented 7.5% of the sample.

There was no difference in the occupational composition between cases and controls. This similarity resulted from the method of sampling a matched control from a residence neighbouring that of the case, since neighbouring houses were generally owned by the same work unit.

Risk Factors for Hepatitis A

Several factors were associated with a greater risk of disease. The risk factors of interest and all significant risk factors for hepatitis, after both univariate and multivariate analysis, are shown in Table 3. All other factors summarized in Table 1 had P-values > 0.2 for unadjusted OR.

All cases and controls were resident in the area, and the majority of them had lived in the same household for more than 4 years (58%). Almost 90% of all households consisted of less than four rooms. More than half of these households (67%) had a living space of less than 50 m^2 and an average of 3.8 (SD = 1.2) people permanently living there. No difference was observed for these factors between the case and control groups.

The cleanliness of the households was assessed on the basis of observations on (i) the condition of the kitchen, (e.g. food particles on the floor, unwashed utensils, presence of flies, animals or poultry as potential vectors of faecal matter), and (ii) the household environment, (e.g. the presence of excrement or garbage). A dirty kitchen, a fly nuisance and littering of the environment with garbage and excrement were associated with the occurrence of hepatitis A, but none of these factors remained statistically significant after adjustment for other factors (Table 3). Some 90% of respondents in households in the immediate vicinity of one of the city's many ponds, lakes or canals reported that flies were a nuisance, compared to 45% of residents living at least one street away from these places. This difference was significant (OR = 7.6, 95% CI : 2.1–34.3; $P < 0.001$). Nevertheless, the location of the household did not confound the association between the perceived fly nuisance and the occurrence of the disease (OR Mantel-Haenszel = 1.75, 95% CI : 0.95–3.21; $P = 0.048$).

Bicycles were the most commonly owned consumer item (69%). As a surrogate indicator for increased wealth and socioeconomic status, the possession of a combination of luxury goods including colour TV, telephone, washing machine and motor-bicycle was investigated, since statements on income were inaccurate. The lack of ownership of these luxury consumer items was significantly associated with the disease after multivariate analysis.

Food and water consumption habits did not differ between hepatitis cases and controls. None of the study subjects reported that they drank water from a potentially contaminated, unprotected source. Neither was it a reported habit in this area to eat raw fish from nightsoil-fertilized fish ponds. Of all the study participants, 129 of 200 (64.5%) reported consuming food outside their homes, either with friends and neighbours (79/200) or at open street restaurants and from street cooks (82/200). No difference between the case and control groups was observed. Vegetables were generally cooked; only three people reported occasional consumption of raw vegetables. Obtaining fresh vegetables from the open street market or directly from the farmer was, however, significantly associated with an almost fourfold higher risk of acquiring hepatitis A as opposed to buying the produce from a supermarket. This risk factor remained statistically significant after multivariate analysis (OR = 3.9, 95% CI : 1.63–9.82; $P = 0.002$).

TABLE 3 *Estimated odds ratios for potential risk factors associated with hepatitis A in urban and peri-urban Wuhan City, PR China*

Potential Risk Factor	Cases	Crude odds ratio[a]	95% confidence interval	Adjusted odds ratio[a]	95% confidence interval
Lack of ownership of selected consumer items	58 (58%)	1.61	(0.88–2.94)	2.47	(1.00–6.15)
No exposure to health education	47 (52%)	5.26	(2.50–11.1)	2.8	(0.95–8.27)
Vegetables from open street market/farmer	67 (74%)	3.7	(1.89–7.28)	3.9	(1.63–9.82)
No handwashing:					
before food preparation and cooking	77 (77%)	5.46	(2.81–10.7)	4.68	(1.82–12.02)
before eating	35 (35%)	5.44	(2.30–13.3)	4.92	(1.55–15.67)
after defaecation	40 (40%)	3.25	(1.60–6.68)	†	
after feeding animals	97 (97%)	2.43	(0.54–12.4)	†	
after working in the garden	96 (96%)	2.67	(0.73–10.6)	8.24	(1.54–44.19)
Household observations:					
Dirty kitchen	23 (24%)	2.65	(1.10–6.47)	†	
Fly nuisance	56 (57%)	1.82	(0.99–3.37)	†	
Presence of animals/poultry in the kitchen	23 (29%)	1.91	(0.84–4.38)	†	
Excrement/garbage around the house	33 (34%)	1.94	(0.96–3.39)	†	
Disposal of children's stools in refuse pit or as fertilizer in the vegetable garden	12 (12%)	4.41	(1.13–25.0)	†	
Respondent had dirty hands or clothes	14 (15%)	3.04	(0.96–10.3)	†	

[a] All factors listed, as well as sex and age were included in the multivariate analysis. Conditional logistic regression was used to obtain adjusted odds ratios. The final model contained only age, sex and the other effects that remained statistically significant ($P < 0.1$) in the presence of one another.
† These factors did not contribute significantly ($P > 0.1$) to the variation in the outcome variable in the presence of the other factors.

Hygiene-related behaviours, such as handwashing and the disposal of children's stools in the household's own vegetable garden or refuse pit were highly associated with the occurrence of hepatitis A. As a more direct measure of personal hygiene, the clean appearance of the respondent, judged by the cleanliness of clothes, hands and face, was also significantly associated with the disease in the univariate analysis. However, only lack of handwashing before cooking and eating, as well as lack of handwashing after working in the vegetable garden, remained highly significant with up to eightfold increased risk for disease after controlling for all other significant factors in the multivariate analysis. Use of a toilet for defaecation when at home (94.5%) was reported by both cases and controls.

Asking about specific knowledge of hepatitis A, no difference between cases and controls was found; 95% of the hepatitis cases knew about the disease before contracting the infection, as did 91% of the healthy controls. An investigation of the source of this knowledge revealed that, during adult life, mass media and pamphlets provided an exposure to health education for 88.4% (167/189) of all the study participants.

In contrast, if asked about any kind of health and hygiene education during schooling, approximately three times as many patients as controls (52% versus 17%) reported not having received health education during their schooling. This lack of health and hygiene education during schooling was associated with a 2.8 times higher risk for contracting hepatitis A (95% CI : 0.95–9.82) after controlling for all possible confounding (Table 3). Enquiry about the nature of such health and hygiene education during schooling years revealed that communicable diseases, disease transmission and prevention have been taught at primary school level but without any curriculum. Since 1992, these topics are taught according to an institutionalized syllabus, however at primary school level only.

DISCUSSION

The present study is one of the few investigations in the Chinese context focusing explicitly on social and latent behavioural risk factors for hepatitis A at household level, using an analytical approach. The investigation of social and economic factors is easier in areas where occupation and income levels are reliable indicators for distinct lifestyles and wealth. In other places, where these factors are difficult to assess and social uniformities prevail, the collection of data on a large number of other measures is needed. Equally, the exploration of potential risk behaviours requires consideration of a

wide range of long and short lived risk factors. Such an approach, however, increases the likelihood of observing associations by chance alone. This should be considered here, since we investigated more than 40 potential social and behavioural risk factors for hepatitis A virus infections.

Further, serological tests amongst controls were not conducted due to the community-based design involving neighbourhood sampling of healthy controls and all the related operational constraints related to performing such testing. This might have led to a bias that reduced the effect of potential risk factors. As almost 75% of our study participants were below the age of 31 and the prevalence of anti-HAV in healthy people of this age group has been estimated to be around 20–30% in similar urban settings,[4,13] this bias was considered as small.

Nevertheless, we found ten risk factors which were significantly associated with the disease in the univariate analysis, and of these, six remained positively associated with the disease in the multivariate analysis. This provides evidence that socioeconomic and behavioural risk factors are important determinants of hepatitis A in this urban Chinese population. This conclusion differs from that of a population-based seroepidemiological study in Hong Kong, where surface area of living quarters, family income and the type of housing as sole indicators for socioeconomic factors did not appear to influence substantially the prevalence of anti-HAV antibody.[10] However, both the latter and our study, provide only a situation analysis in a narrow time frame of the morbidity and a spectrum of health risks. Therefore, repeated studies not only of seroprevalence,[10,13] but also of health risk patterns would be needed to enable time series analysis. Such an approach would provide more decisive evidence for the conclusions that were made, since the dynamics of both changes in seroprevalence of anti-HAV and of the reduction or the rise of new health risks in the population could be evaluated. This is of prime importance in those developing areas, including Chinese cities, where socioeconomic and public hygiene improvements may lead to the paradox where the overall endemicity of hepatitis A infection decreases due to a reduced risk exposure in the earlier years in life,[10,13] and the rate of clinical cases increases due to a grown large reservoir of new susceptibles.[6] This is best illustrated in the severe epidemic of hepatitis A in Shanghai which mainly affected young adults who were susceptible due to lack of exposure that resulted from the general economic and environmental improvements.[3] In the present study a possible bias due to socioeconomic difference was reduced by sampling neighbourhood controls.

With regard to the composition of the study sample, we noted a significant imbalance in the gender and the occupational structures in favour of males and of participants who were employed in or linked to governmental services. The latter imbalance is possibly due to the fact that provision of health facilities and health services free of charge in governmental institutions, including universities, substantially facilitates access and use of health services for this population group.

No reference is made to a gender-specific morbidity pattern for hepatitis A in the literature.[6,19,23] However, the over-representation of males (70%) in the present study is consistent with one population-based study in China that demonstrated a significant difference in the sex ratio of 1.75:1 in males:females.[2] In their description of health status differentials Lawson and Lin described a significantly higher mortality rate in males for 1989 and 1990, indicating that, for the whole of China, gender imbalance exists for infectious diseases in general.[24] However, as shown in recent gender-sensitive research, such imbalances do not always represent true gender differences in transmission, but rather also reflect diagnostic biases.[25]

A high risk of hepatitis A existed for working in vegetable gardens. In the context of the widespread commercial and private use of nightsoil for crop fertilization, this activity increases the likelihood of a subject's hands and body being contaminated with nightsoil. The direct use of untreated children's stools for manuring purposes in vegetable gardens has been reported in China and the Far East.[21] Although significant in the univariate analysis only, this habit poses an important risk of infection with hepatitis A at household level. This is underscored by the evidence that children's stools are generally more infectious than those of adults,[26] yet popular beliefs in other countries, like Sri Lanka and Papua New Guinea, affirm the opposite.[27,28]

Other important findings were the absence of any association between hepatitis A and lack of handwashing after handling children's stools, crowded living conditions, and the respondent's dirty appearance as an indicator of hygiene. An association of the latter was only found in the univariate analysis but disappeared in the logistic regression.

We found a substantial risk for hepatitis A if vegetables and fresh produce were bought from farmers or street vendors at popular open roadside markets, where foodstuffs are often displayed under unhygienic conditions. In the context of the existing crop fertilization practices, the current sub-optimal distribution of fresh produce even fosters contamination of foodstuffs. One study known to us from the US[29] reported on an outbreak of hepatitis A caused by the distribution

of contaminated lettuce, which had been improperly handled. Our findings emphasize the need for reinforcement of the existing municipal measures for food hygiene monitoring and control[30] with particular emphasis on a hygienic display of the produce off the ground and at pre-assigned places distant from faecally contaminated surroundings such as public toilets, fish ponds and street canals.

Our result of a positive association between inadequate handwashing practices and the occurrence of hepatitis A has, to our knowledge been reported only once previously within the Chinese context. In a limited case-control study in Shashi City in Hubei Province handwashing practices before eating and after defaecation were associated with hepatitis A infections,[20] thus supporting the important role of adequate handwashing to interrupt the faecal-oral route of hepatitis A transmission.

In our study, the association of omitting handwashing after defaecation disappeared in the multivariate analysis, possibly because the factor 'failing to wash hands before food preparation and cooking' is more closely linked to disease transmission. On the other hand, lack of handwashing after working in the vegetable garden showed an increased relative risk estimate in the multivariate analysis. Surprisingly, no correlation of this factor with other handwashing variables was found.

The behavioural risk factors for hepatitis A infection found in this study suggest clear health and hygiene education messages which should aim at reducing disease transmission through changes in certain behavioural patterns. At household level, specific topics to be addressed should focus on defaecation habits, disposal of children's faeces and related handwashing habits, as well as kitchen and compound hygiene and proper food handling and preparation measures which reportedly reduce the level of contamination of foodstuffs.[31] Further, health consciousness should be raised regarding the potential risks of contaminating body, hands and food with faecal matter whilst working in rice and vegetable fields or whilst handling agricultural products. Since all these activities are directly or indirectly linked to the common practice of reuse of human waste in local agriculture, the problems of controlling human exposure and strictly enforced compliance with protection measures should be addressed at municipal level and should form part of future control programmes. Hespanhol[32] has recently outlined the feasibility of, and effective measures to reduce, occupational exposure in nightsoil management. Interventions introducing behavioural modifications have been implemented and their positive effects evaluated.[33,34] However, the social feasibility of changing existing traditional practices and habits can only be assessed with a prior, detailed understanding of the cultural values attached to them. Such practices often appear to be preferences by the people, yet facilitate disease transmission, e.g. fertilizing crops with fresh nightsoil just before harvest to create a good flavour.[21,22]

In the present study sample a high level of general education was observed; 76.7% of all participants were educated up to or above middle school level, and almost 95% of all the participants knew specifically about hepatitis, but through channels other than school. A striking finding was, therefore, that the exposure to health and hygiene education during schooling, but not later in life, was lower in the hepatitis A group than in the control group. This probably reflects that health and hygiene knowledge did not seem to have been incorporated or retained among cases but appeared to provide a fundamental understanding of health and hygiene amongst controls. Although it is not known what constitutes this inherent knowledge, the behavioural risk factors for hepatitis A identified in this study might be a consequence of the prevailing gap between the high level of the public's general education, and the general understanding of health issues. Specifically targeted health education programmes at primary and middle school level and in factory working units, as well as public awareness campaigns, could fill this gap. Recent Chinese health policies are already focusing on the prevention of infectious diseases, improving the quality of drinking water and increasing the standards for hygiene of food supplies and health service management.[30] Studies on specific social and behavioural determinants for disease, like the one presented here, might help to readjust current health propaganda practices by providing a basis for the formulation of appropriate health and hygiene interventions and education campaigns.

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