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Report-Survey on the Childhealth Status of Chinese New Immigrant: July-October 1998

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Abstract During the period 8 July to 10 October 1998, 457 new immigrant children from China were recruited mainly within 2 weeks of their arrival to Hong Kong to undergo an examination on their physical health status. Their mean age was 8.8 years with 58.2% between 8 and 13 years of age. Overall, one in two children had a medical condition that may require medical attention. The nutritional status was generally good though they tended to be lighter in weight, shorter in stature than the Hong Kong counterpart. Obesity was found in 11.5% and 7.0% of boys and girls respectively using weight-for-height of >120% of median. But using body mass index (BMI) obesity occurred in only 1% of children. Information on the vaccination status was unavailable in about half of the cases. Blood testing revealed that 9%, 50% and 20% of them were susceptible to measles, rubella and mumps respectively. No children under 7 years of age carried hepatitis B surface antigen but 13.2% of those older than 7 years had the antigen. About 75% had antibodies against hepatitis B surface antigen. Tuberculosis was uncommon. Two had history of TB infection and 13% had positive skin test against tuberculosis. 18.1% and 2.6% of children had a blood lead level of > 0.47 μmol/L and > 0.71 μmol/L respectively. Over 93% showed a decrease in blood lead level 2-3 months after coming to Hong Kong. None required medical treatment except for counselling on avoidance of risk factors. Severe anaemia was found in two children and both needed urgent treatment. About 15% of children were infested with worms. This was particularly common in children aged between 4 and 9 years. About half of the children needed referral for medical management. However, about 20% of the children returned to China soon after their arrival in Hong Kong. For public health purposes and for the health of this significant portion of future Hong Kong generation it would seem prudent to ensure all new immigrant children to a) receive full vaccination b) have appropriate physical check up and c) receive appropriate health education at their first entry to Hong Kong.

Key words Health status; Immigrant children; Lead poisoning

Introduction

In 1996, 29,600 children under 18 years of age immigrated to Hong Kong from China.[1] After immigration, this group of children undergoes tremendous pressure to adapt to educational, cultural and socio-economic system of Hong Kong. The problems related to the adjustment and education have been studied by several agencies.[2] However, little is known about the status of their physical health. For good health planning, it is essential to have good information on the health status of this group of children as they constitute a significant proportion of our new generation.

With the generous funding from the Hong Kong Child Health Foundation, assistance from Department of Health, Hospital Authority, Immigration Department, Tuen Mun Hospital and Princess Margaret Hospital a survey was conducted to study the health status of new immigrant children from China.

Methods and Materials

From 8 July to 10 October 1998 letters were sent through the Immigration Department at Lo Wu Station to

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new immigrant children under 18 years of age inviting them to join the study. They were invited to attend a body check up at Princess Margaret Hospital within 7 days after their arrival. At the study day (Saturday afternoon), they were invited to fill in a standard questionnaire detailing their age, residence in China, vaccination status, past history of diseases and education levels of their parents. The height, weight, head circumference and triceps skin fold were measured using standard methods by a doctor.[1] Blood was taken for blood lead level, haemoglobin level, red cell indices and serology for hepatitis B, measles, mumps and rubella. Mantoux tests (MT) were performed by health nurses using MT 1 unit. Three specimen bottles for stools and scotch tapes were delivered and they were asked to collect three daily stools and mounted scotch taping at perianal region in the morning. The specimens were collected on the coming Tuesday and the Mantoux test would be read at the same time by the health nurse.

Those with high blood lead level were invited to come back for investigation on source of lead and follow up on blood lead level.

Results

The exact number of new immigrant children passing through Lo Wu Station during the study period was not available. 458 children less than 18 years old attended the Survey. One child who arrived in 1996 attended the survey and was excluded from the study. 97.5% were examined within 14 days of their arrival (mean 5.3 days minimum 1 day, maximum 52 days). The number of families studied was 396 (344 families with 1 child attended, 45 families with 2 children, 6 families with 3 children and 1 family with 5 children).

There were 201 girls and 256 boys. The mean age was 8.8 years (standard deviation 4.2, median 9.9, mode 10.1, minimum 0.77, maximum 17.8) and about half were 8-13 yr. old (58.2%).

Majority came from Guangdong Province (89.6%) of which 26.7% came from Shenzhen and 10.4% from others provinces (the northeast provinces, the coastal cities as well as provinces from the southeast). 34 did not put out down their address in China. Children coming from places outside Guangdong were younger, 59.1% (26/44) < 5 yr. old and 97.7% (43/44) < 13 yr. old.

About one half did not put down the education level of parents. Of those who had supplied the information, most had primary or secondary education (Table 1). The distribution of the education level between father and mother were similar. The parents' education levels were higher in those coming from places outside Guangdong ($p<0.0007$). Parents' jobs category were not analysed as there were very heterogeneous and difficult to categorize.

Medical Conditions

From the self-reported questionnaire, the incidences of medical conditions were not significantly higher than most international references. They probably are comparable to figures in Hong Kong children though in some conditions exact incidences were not available. However, these were self-reported conditions and had not been validated. Overall, each child had 0.5 medical problem (Table 2).

Vaccination

194 (42.5%) did not provide this information. Those who had 33 (13%) had no history, 77 (29%) had incomplete vaccination and 153 (58%) had full immunization according to schedule.

Rubella Antibodies

The percentage of children with rubella antibody increased with age (Table 3). Overall 58.6% (246/420) had antibodies. By 15 years of age, about 62% of boys and 54% of girls had rubella antibody. The positively rate is not related to sex, parents' education level and place of residence in China and vaccination history.

Table 1 Parents' education level

Education level	Father	Mother
Missing data	40.0% (183/457)	58.0% (265/457)
No education	1.3% (6/457)	0.7% (3/457)
Primary school	25.2% (115/457)	16.0% (73/457)
Secondary school	32.6% (149/457)	24.2% (111/457)
Higher education	0.9% (4/457)	1.1% (5/457)

Table 2 Prevalence of self-reported medical conditions

	Counts			Percentages		
Bleeding tendency	12/423			2.8%		
Asthma	46/417			11.0%		
Abdominal pain	28/222			12.6%		
Epilepsy	1/400			0.3%		
Poor school work	8/295			2.7%		
Visual problem (adjusted)	34/328			10.4%		
Poor hearing	3/332			0.9%		
Poor activity	5/329			1.5%		
Enuresis	15/340			4.4%		
Renal disease	1/419			0.2%		
Snoring	34/422			8.1%		
Tuberculosis	2/422			0.5%		
Heart disease	3/420			0.7%		
Liver problem	12/422			2.8%		
Genetic problem	4/418			0.9%		
On long termed drug	8/421			1.9%		
Overall (adjusted)	155/423			36.6%		
Number of medical problems	0	1	2	3	4	5
Number of Children (adjusted)	268	111	32	8	3	1

Table 3 Sero-prevalence of rubella antibody

	Male			Female		
Age group	n	No	(%) positive	n	No	(%) positive
< 1	1	0	(0%)	3	0	(0%)
1-4	43	15	(35%)	42	18	(43%)
5-9	70	42	(60%)	46	28	(62%)
10-14	113	81	(72%)	79	49	(62%)
15-19	13	10	(77%)	10	3	(30%)
Total	240	148	(62%)	180	98	(54%)

Mumps

The percentage of children having antibodies against mumps was 80% (Table 4). Similar to rubella, most did not have vaccination against mumps and acquired the disease through natural infection.

Measles

The overall sero-positively rate for measles was 91% (Table 4). Measles vaccine is routinely given at 8 months of age in Guangdong province and a second dose is given again at 4 and/or 7 years of age depending on city of residence.[3]

Hepatitis B Markers

The overall carrier rate was 8.3% (35/420). Many carriers did not know their HBV status. No children younger than 7 yr. old had hepatitis B surface antigen (HBsAg) in the blood. Carrier rate after 7 yr. old was 13.2% (35/265). There may be age cohort effect (event occurred early, effect persisted and is detected later). There was a trend that percentages of carrier increased with age (Table 5). The prevalence of anti-HBsAg is similar for all age groups - overall of 75.0% (315/420). About 17% were negative for HBsAg and HBs antibodies and would benefit from hepatitis B vaccination. The samples were not tested for anti-hepatitis B core antibodies. Twelve (2.8%) gave a history of liver problem but only 1 child had history of hepatitis. Two out of 6 children with history of liver problem were HBsAg positive. The HBsAg positively rate is not related to sex, place of residence in China and parents' education level.

Tuberculosis

Two children (0.5%) had a history of tuberculosis infection giving an disease rate of 539.8 per 100,000 child-

year. 316 children (74.7%) gave a history of BCG vaccination but written record was available in 126 (29.8%) children. On examination 328 (77.5%) children had BCG scar. 41 children (15.5%) without BCG scar had history of BCG vaccination. Overall, at least 87% of children had received BCG vaccination. 55 children had 2 to 4 BCG scars indicating that many had been vaccinated 2 to 4 times.

Overall 13% had a positive MT test as defined by indurations of >10 mm by day three. Older children were more likely to have greater response. Majority (91%) of those with positive MT test occurred in children > 8 years of age. Of these only 11% gave a history of BCG vaccination.

Of the 368 children having a 0-10 mm induration from MT test, 84 (22.8%) did not have BCG scar. Of the 55 children having 11-20 mm of induration from MT test, 11 (20%) did not have BCG scar.

Growth Parameter

The height, weight, head circumference and triceps skin fold showed right skewed (tail towards large values) normal distribution (Table 6). When compared to the 1993 Hong Kong standard, they were shorter in stature, lighter in weight and smaller in head size. No difference was detected for triceps skin fold thickness.

Using >120% and <80% of weight-for-height median as obesity and wasting respectively, obesity and wasting occurred in 9.5% and 4% of children respectively (Table 7). When stratified in different age groups, the 0-1

Table 4 Sero-prevalence of mumps and measles antibodies

	MUMPS			MEASLES		
Age group	n	No	(%) positive	n	No	(%) positive
< 1	4	1	(25%)	4	4	(100%)
1-4	85	47	(55%)	85	75	(88%)
5-9	116	97	(84%)	116	107	(92%)
10-14	192	169	(88%)	192	175	(91%)
15-19	23	22	(96%)	23	21	(91%)
Total	420	336	(80%)	420	382	(91%)

Table 5 Sero-prevalence of hepatitis B markers

Age group	n	HbsAg + (%)	Anti-HBs + (%)
<1	4	0	4 (100%)
1-4	85	0	69 (84%)
5-9	116	7 (6%)	88 (80%)
10-14	192	23 (12%)	138 (73%)
15-19	23	5 (22%)	16 (76%)
Total	420	35 (8.3%)	315 (75%)

Table 6 Distribution of growth parameters according to Hong Kong growth standards

HK Percentile		Head circumference	Height	Weight	Triceps skin fold thickness
<3	3%	5.5%	8.5%	5.7%	4.3%
3-10	7%	11.4%	10.9%	13.5%	5.9%
10-25	15%	22.9%	17.5%	20.8%	17.5%
25-50	25%	24.3%	25.8%	22.5%	25.8%
50-75	25%	21.4%	20.1%	18.9%	22.0%
75-90	15%	8.6%	10.7%	9.9%	13.5%
90-97	7%	4.0%	3.1%	5.2%	6.9%
>97	3%	1.9%	3.3%	3.5%	4.0%
Missing counts		37	35	34	35
Goodness of fit test by χ^2		<0.005	<0.005	<0.005	>0.1

years (50%), 3-4 years (20.5%), 5-6 years (23.1%) and 6-7 years age groups (22.2%) had a higher proportion of obesity. By using body mass index (BMI=weight/height^2) only 2.1% was over-weight (>25) and 1.2% obese (>30). As a whole, wasting and obesity were not related to sex, age, parents' education level and school work result.

The obesity rate for the new immigrant children was 11.5% for boys and 6.8% for girls aged 3 and 18 years. When compared to the obesity rate in Hong Kong children of the same age (13.4% for boys and 10.5% for girls) there was no statistical differences between the two groups (p value between 0.07 and 0.27 circumferences).

A trend of bigger head among younger children was found suggestive of age cohort effect (event occurred at younger age, effect persisted and is detected later). There were similar but not significant findings in height and weight.

Children coming from places outside Guangdong were larger in head circumference, heavier in weight and thicker in triceps skin fold. They had left skewed (tail towards small values) normal distributions. There was no difference in height compared to children coming from Guangdong region.

Serum Lead Level

Major concern for the toxic effects of lead is on neurodevelopment. The impact of lead exposure on cognition in young children at blood lead level of ≥ 0.48 μmol/L (10 μg/dl) has been well established. In 1991, the Center for Disease Control and Prevention has redefined elevated blood lead levels as those ≥ 0.48 μmol/L and a new set of guidelines for treatment was recommended (Table 8).[4]

18.1% and 2.6% of children had blood lead level of > 0.47 μmol/L and >0.71 μmol/L respectively. None had a level above 0.96 μmol/L. Higher proportion of high blood lead levels was found in 4-14 yr. age group. High blood lead group occurs mainly in 9-13 yr. age group. The sex, place of residence in China, and parents' education level were not found to be related to blood lead level.

Children with high blood lead level had smaller head circumference and shorter in stature compared with those having normal levels. No children with high blood lead levels had their (70 children) heads bigger than 90th centile ($p<0.0006$). Only 1 in 71 children had height greater than 90th centile in the high lead group ($p<0.002$). Similar trend was observed in weight but not reaching statistical significance. Triceps skin fold was not affected. However, no significant differences were found in those with high and normal blood levels with respect to haemoglobin level, red cell indices, school work and history of abdominal pain.

All children with high lead blood level were called for follow up. Only 63 (81.8%) turned up for medical assessment despite repeated telephoning and sending mails. On direct questioning risk factors for high blood level included water supply was from well or river (19%), where the water was described as polluted either because of the grossly turbid appearance or the need to use purifier provided by the local authority before actual consumption; regular ingestion of herbs as tonics for common ailments (17.5%) and various other factors including the habit of biting pencil or toys, frequent playing in dumping grounds, residing next to paint/metal work factory or along highways, habit of inhaling car exhaust and cooking with petroleum in home (Table 9). Symptoms and signs among these 63 children included occasional abdominal pain (8), headache (7), short stature (3) and learning difficulty in 1. The clinical significance of these symptoms is questionable as they bear no relationship with blood lead level. The

Table 7 Obesity and wasting rate by sex (0-18 years old)

	Wasting	Normal	Obese
Boys	2.6%	85.9%	11.5%
Girls	5.9%	87.1%	6.8%

Table 8 Recommendations by AAP for management of high blood lead levels in children

Blood lead level (μmol/L)	Action
<0.47	No action
0.48-0.71	Repeat in 1 month. Education to decrease lead exposure
0.72-0.96	Repear in 1 month. Nutritional and educational intervention
0.97-2.16	Medical and environmental evaluation, may need treatment
2.17-3.37	Medical and environmental evaluation, chelation therapy
>3.38	Medical emergency

blood lead level in the child with learning difficulty is only 0.485 μmol/L.

The second blood lead level performed at 2-3 months later showed a decrease in 93.4% of cases but in 6.6% there was an increase (Table 10). Among the 4 children with increased blood lead level, 1 had the habit of deliberate inhalation of car exhaust and the other took herbs regularly, the third loved to bite pencils, took herbs and live in an old building of more than 30 years old with ragged and easily detachable interior wall paints. No particular risk factors were identified in the fourth one.

Education on the ways to minimize lead exposure was given to all children and their parents during the second visit for blood sampling. Of the 27 children with blood lead level >0.47 μmol/L in the second blood sampling, 18 turned up for third blood taking 2 months later. 16 including the 4 children with increasing blood lead level showed further reduction in blood lead level. The remaining 2 children showed a slight increase in blood lead level. One showed an increase from 0.51 μmol/L to 0.54 μmol/L the other one 0.54 μmol/L to 0.73 μmol/L. No risk factors could be identified in the first one but the second child admitted to have continued regular herb ingestion after the second blood sampling. A fourth blood sampling has been scheduled for these children.

Haemoglobin and Red Cell Indices

Anaemia was found in 1.6% (7/426) of children. MCV, MCH and MCHC were found to be low in 13.1%, 11.0% and 6.1% respectively. Two had very low haemoglobin level requiring admission and were both due to iron deficiency. One was due to menorrhagia and the other due to peptic ulcer bleeding. The ulcer pain and bleeding was not apparent on initial assessment as the mother who was looking after the child in China was not available. The history of melena and ulcer pain was available only when the mother also immigrated to Hong Kong a few months later. The low MCV, MCH and MCHCs except in the two cases were mainly due to Thalassaemia trait. The incidence was quite comparable to that found in Southern China.

Worm Infestation

14.8% (53/359) children were found infested with worm and 2.1% (7/341) had 2 types of worms. 36 children had Enterobius, 13 Trichuris, 9 Ascaris and 2 Clonorchis. Worm infestation was more common in the 4-9 year age group, 22.7% (22/97), followed by the 10-14 yr. group, 14.8% (23/132). Ascaris, Trichuris and Clonorchis were not found in children living outside Guangdong. However, as the sample size was too small, 37 children only, and this might not be of significance.

Medical Consultation, Hospital Admission and Medical Referral

The number of children having medical consultation

Table 9 Risk factors for high blood level

Risk factors	Number	Percent
Drinking water coming from well or river	12	19.1%
Regular ingestion of herbs	11	17.5%
Water source polluted	5	7.7%
Pica	4	6.1%
Biting pencils or toys	4	6.1%
Cook by petroleum at home	3	4.6%
Frequent playing in dumping grounds	3	4.6%
Residing next to paint/metal work factory	2	3.1%
Residing along road/highways	2	3.1%

Table 10 Serial blood lead levels

Blood lead level	First (Jul-Aug)	Second (Oct-Nov)	Third (Jan-Feb)
≤0.47 μmol/L	0	34 (55.7%)	4
>0.47-0.71 μmol/L	67 (87%)	24 (39.3%)	13
0.72-0.96 μmol/L	10 (13%)	3 (4.9%)	1
Total	77	61	18

in China in the one year before coming to Hong Kong was 11.7% (40/341) with a mean of 0.66 consultation/child-year (range 0-30 consultations/year). However, data on the causes for the consultation were incomplete.

The number of children having had hospital admission in China one year before coming to Hong Kong was 4.9% (19/391): 16 children were admitted once, 3 were admitted twice. The mean was 0.056 hospital admission/child-year. Again, information on the causes for hospital admission was incomplete.

Medical Referral from the Survey

Children with miscellaneous medical conditions e.g. renal or heart diseases were referred to specialist outpatient clinics on the spot. Children with the followings were referred for further management - high lead level, anaemia, abnormal red cell indices, HBsAg positive, worm infestation, growth parameter (head circumference, height or weight) <3rd or >97th centile and history of enuresis after 4 years old. The total number of children referred was 231 (52.4%). Many medical problems were not known by the parents, e.g. high lead levels, HBsAg carrier status and worm infestation.

Discussion

The exact response rate is difficult to calculate as exact number of letters sent out and the number of new immigrant children <18 yr. old from China going through the Lo Wu Station during the study period were not available. Whether there was volunteer bias i.e. healthy subjects tend to volunteer for body check up is difficult to estimate. However, the demographics of the group were quite comparable to those in other studies conducted on new immigrants previously.

Self Reported Medical Problems

The self reported medical health problems as depicted in the questionnaire were comparable with health statistics of Hong Kong children. In the report from the Hong Kong Student Health Services 1996/7, heart problem was found in 1%, hearing problems 0.5% and visual problems 46.8% of the students. Compared to figures from China - ascariasis rate of 18.6%, anaemia 19.5%, visual problem 29.5% and TB 0.03% the health status of these group children was much better. Also, among the 457 children one had achondroplasia while none of the others had gross abnormalities, e.g. gross mental retardation and cerebral palsy. This may be due to participation bias or that children with gross abnormalities tended to stay in China or did not come to our survey. Further study in the school setting would clarify this.

Growth Parameters

The growth parameters of this group of children had not been compared with the growth charts of China. When compared to the 1993 Hong Kong growth chart they were found to be shorter in stature, lighter in weight and smaller in head size. As most children were from Guangdong and would be of similar ethnic origin as that of Hong Kong children the difference would be due to differences in health and socio-economics status. Appropriate nutritional education will be needed to improve on the dietary habit and to attain better growth parameter.

Using >120% and <80% of weight-for-height median as obesity and wasting respectively, obesity and wasting occurred in 9.5% and 4% of children respectively. When stratified in different age groups, the 0-1 years (50%), 3-4 years (20.5%), 5-6 years (23.1%) and 6-7 years age groups (22.2%) had a higher proportion of obesity. By using body mass index (BMI=weight/height^2) only 2.1% was overweight (>25) and 1.2% obese (>30). As a whole, the incidence of obesity as defined was quite similar to that of Hong Kong children.

Vaccine Preventable Diseases

Mumps, rubella and hepatitis B vaccinations are not given routinely in China. That 41%, 9% and 20% did not have antibodies against rubella, measles and mumps respectively is of concern. In the past decade Hong Kong has strengthened vaccination strategies to ensure a very low susceptibility rate to mumps, measles and rubella. It will usually require over 95% sero-positively rate to prevent outbreaks. With the influx of new immigrants, a pool of susceptible people will accumulate over the years culminating in an outbreak. Thus it is advisable to vaccinate or re-vaccinate all new immigrant children against MMR. The best time would be at their first entry to Hong Kong.

The incidence of tuberculosis was not high and was quite similar to that found in Hong Kong. It is common practice in China to have BCG revaccination at 3 month and 7 year of age, hence the reason why many are having 2-4 BCG scars.

Implication of Hepatitis B

For the past 10 years, Guangzhou and Guangdong have

launched hepatitis B vaccination programme in newborns on voluntary basis, the HBsAg carrier rate in age group 0-10 years has declined rapidly from 10% to below 2%.[5] The very low number of HBsAg carrier children <7 years old confirmed this finding. The 13% HBsAg carrier rate in children over 7 years of age is quite comparable to figures reported in China.

With the introduction of hepatitis B vaccination in 1998 in Hong Kong, the HBsAg carrier rate in local pregnant women has decreased from 10% to 8.4% in 1996.[6] Data on carrier rate in children are not available. Most young children probably would be protected by vaccination but may not be so for children over 10 years of age. HBsAg carrier children have a high chance of developing liver diseases and will also serves as a potential source of infection through horizontal transmission in school or through sexual transmission later on in adulthood. To minimize the spread of the infection, it may be worth advising all who have not been immunized or infected to screen for hepatitis B status. Those who have not been infected should be immunized.

Implication of High Blood Lead Level

That 18% of children had high blood lead level of over 0.47 μmol/L is a community health concern. Persistently high serum levels will affect the intellectual development of the children, our next generation. It has been consistently found that young children with blood lead level of around 0.72 μmol/L had an average loss of 2-3 IQ points compared with children with blood lead level of around 0.47 μmol/L.[7] From the Survey, few of them require immediate treatment. The findings that children with high lead level had smaller head circumference and shorter stature is a concern but would need further study to determine whether this is due to lead toxicity or associated with poor nutritional or environmental factors.

Childhood lead poisoning is very common in China due to rapid industrialization and use of leaded gasoline. The reported percentages of blood lead levels above 0.48 μmol/L in children ranged from 64.9% to 99.5%.[8] Environmental risk factors for high blood lead level in China include pollution in drinking water, use of coal or petroleum as fuel, smoking and living near factory or roadside. Behavioural risk factors include regular ingestion of preserved eggs, pica and biting of pencils or toys.[9] Herbs had not been found to be a major factor but it has been found some herbs do contain quite a high level of lead and frequent ingestion of herbs would be one important risk factor that will warrant further investigation.

The fact that 93% of children initially having high blood lead level showed a decrease in blood lead level after coming to Hong Kong without intervention indicates that environmental risk factors are most important. The mean lead level in outdoor dust in nursery schools, kerb side dust and coastal waters had much lowered in the past 10 years.[10-12] Drinking water in Hong Kong is very safe. Thus, it would indicate that in general the environmental lead level in Hong Kong is acceptable. Blood lead level in Hong Kong children has not been found to be high except in fisherman's children (Table 11).[13] Other factors are industrial exposure and ingestion of some proprietary medicines.[14] In several children, the blood lead level did not show a decrease on second blood taking. On further questioning many continued to take herbs regularly in Hong Kong. After counselling all showed a decrease in blood lead content at the third blood taking. Herb ingestion would be important risk factor. The types of herbs ingested were heterogeneous and variable and one would not identify any particular high risk herbs. Among the herbs taken 子 was one commonly taken by the group. It has been reported that 子 coming from a certain region contained high lead content.[15] It would be helpful to test for the lead content in the 子 and some of the herbs sold in Hong Kong.

The number of children coming back for followup was only 82% as many children had returned to China after the first visit. Long-termed follow-up is necessary to confirm the resumption of a non-toxic serum lead level after arrival and to monitor their development. It would be desirable to screen for blood lead in new immigrants with high risk factors.

Anaemia

One case of severe anaemia was due to menorrhagia.

Table 11 Blood lead levels of Hong Kong children compared to EEC standards[1]

Blood lead level	EEC guidelines	School children*	Fisherman's children#
≥40 μg/dl			10.4%
≤35 μg/dl	98%	99.3%	87.2%
≤30 μg/dl	90%	99.0%	80.8%
≤20 μg/dl	50%	90.7%	57.6%

*6000 school children from 32 schools aged 6-16 years[2]

#125 fisherman's children

In general, medical knowledge or health awareness have not been found to be adequate. Health education should be provided to them including their family members. The other child had bleeding peptic ulcer, which was confirmed by gastroscopy. The history of melena and ulcer pain was not available till the child's mother had immigrated to Hong Kong several months later. Assessment of this group of children can be difficult as not uncommonly, the one looking after the child is not available for history taking.

Basing on the red cell indices, most of the children with low MCV are probably due to Thalassaemia. Further investigations are being done to delineate the exact cause of low MCV. It has been reported that a significantly higher percentage of babies with Cooley's anaemia were born to new immigrant mothers. Most did not have prior MCV screening. Education and screening for Thalassaemia traits should be given especially to the adolescents.

Implication of Worm Infestation

Some 15% of children were found infested with worm and 2% had 2 types of worms. This would represent the minimum incidence as many presented with only one or two stool specimens for investigation. There is no recent local data on incidence of worm infestations in Hong Kong. Basing on local experience and the environmental condition in Hong Kong, worm infestation other than pinworm should be uncommon. The very good sanitation condition and lack of rural area in Hong Kong would not favour spread of worms to other people. However, they do present a hazard to their family members. Clonorchiasis used to be a common infestation in Hong Kong and is associated with biliary tract cholangiocarcinoma and recurrent pyogenic cholangitis. Light infestations by ascaria and trichuris usually do not give rise to recognizable clinical manifestations, only heavy infestations can cause significant health problems. It would be desirable to screen for worm infestation in new immigrant children. Those infested and their family members should be treated and their personal hygiene enforced.

Physical Health Needs

Basing on a referral criteria of high lead levels, anaemia, abnormal red cell indices, HBsAg positive, worm infestations, growth parameter (head circumference, height or weight) <3rd or > 97th centile, history of enuresis after 4 years old and other medical conditions about half will need referral for further investigation or management. However, if these health problems are not screened and tackled at their first entry to Hong Kong the opportunity for early detection will be lost. Also some 20% of children after getting their identity cards would return to China for residence. They might come to Hong Kong for good at any time. It will then be very difficult to trace this group of children. For public health purpose and for the health of this significant portion of future Hong Kong population, it would seem prudent to ensure all new immigrant children to a) receive full vaccination, b) have complete physical check up, c) receive appropriate health education, d) obtain information on health care services at their first entry to Hong Kong.

Recommendations

1. MMR vaccines and mop up for hepatitis B should be given to all new immigrant children soon after their arrival in Hong Kong.
2. All new immigrant children need be advised to have physical check-up after coming to Hong Kong to look for medical and psycho-social problems. It would be desirable to screen for blood lead level, haemoglobin, MCV, and ova and cyst in stool.
3. General health information and guidance should be provided especially on personal hygiene, diet and ingestion of herbal medicine.
4. Information on health services should be provided.
5. Medical professionals should be informed of the results of the study and should provide opportunity screening and guidance whenever newly immigrant children are encountered.
6. Further studies needed:-
   a. Larger study is needed to confirm the finding and to determine the health impact on Hong Kong.
   b. Lead content is herbs
   c. Causes of the abnormal red cell indices - this group of children had been invited for further investigation the result of which will be reported later.

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