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Demographic and parasitic infection status of schoolchildren and sanitary conditions of schools in Sanliurfa, Turkey

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Abstract

Background: The design and development of school health programmes will require information at demographic characteristics of schoolchildren and the major health burdens of the school-age group, the opportunities for intervention and the appropriateness of the available infrastructure. This study aims to analyse demographic and parasitic infections status of schoolchildren and sanitary conditions of schools in Sanliurfa province of south-eastern Turkey.

Method: Three primary schools were randomly selected in the shantytown, apartment and rural districts. A total of 1820 schoolchildren between 7–14 years age were took part to the survey of whom 1120 (61.5%) were boys and 700 (38.4%) were girls. A child form (including child's name, sex, age, school grade and parasitic infections) and school survey form (including condition of water supply, condition of latrines, presence of soaps on the basins and presence of garbage piles around to the schools) were used for demographic, parasitic and sanitary surveys. Stool samples were examined by cellophane thick smear technique for the eggs of intestinal helminths.

Results: The demographic survey showed that number of schoolchildren was gradually decreased as their age's increase in shantytown school. The sex ratio was proportional until the second grade, after which the number of females gradually decreased in children in shantytown and rural schools while, in apartment area, schoolchildren was proportionally distributed between age groups and gender even the high-grade students. The prevalence of helminthic infections was %77.1 of the schoolchildren in shantytown, 53.2% in apartment district and 53.1% of rural area. *Ascaris lumbricoides* was the most prevalent species and followed by *Trichuris trichiura*, *Hymenolepis nana* and *Taenia* species in three schools. Sanitation survey indicated that the tap water was limited in shantytown school, toilet's sanitation was poor, available no soaps on lavatories and garbage piles were accumulated around the schools in shantytown and rural area, while, the school in apartment area was well sanitised.

Conclusions: These results indicated that burden of parasitic infections and poor sanitation conditions constituted public health importance among to the shantytown schoolchildren. School health programmes including deworming and sanitation activities through the health education and improvement of sanitation conditions in the schools have a potential to better health and education for schoolchildren. These programmes also offer the potential to reach significant numbers of population in the shantytown schools with high level of absenteeism.

Background

The World Health Organisation (WHO) estimates that more than one billion of the world's population is chronically infected with soil-transmitted helminths and 200 million are infected with schistosomes [1]. The high prevalence of these infections is closely correlated with poverty, poor environmental hygiene and impoverished health services [1,2].

The Sanliurfa province is in developing region in south-eastern of Turkey. Although, several studies indicated that intestinal helminth infection was endemic among community [3,4], but, there was no available data about demographic and parasitic infection status of schoolchildren and sanitary conditions of schools. For examples; how demographic factors are characterised in the province schools? For examples, what is the distribution of schoolchildren according to their ages? What are male and female absenteeism rate from the schools? What are the reasons for male and female absenteeism from schools? These factors should be analysed in local circumstances to evaluate which proportion of school-age children will be benefited and which proportion of school-age children will be disadvantaged from school health programme [5].

Another problem that needs to be analysed is what is the situation about parasitic infections about schoolchildren in the province? Because, intestinal helminth infections most common infection among school-age children and tend to occur high intensity in this age group [2,6]. Also, helminth infections leading nutritional deficiency and impaired physical development are likely to have negative consequences for cognitive function and learning ability [7,8].

Third problem needs to be evaluated is what are the condition of water supply and toilets in the primary schools? Is water supply sufficient or lack? Are toilets sanitised? Are there available soaps on the basins? Are there garbage piles around to the schools? Because, poor sanitation conditions such as lack or limited water sources, poor latrine conditions, available no soaps on basins and presence of garbage piles around to the schools provide suitable conditions for the transmission to the certain contagious infections and intestinal helminth infections to schoolchildren [9,10].

All these questions should be analysed in preparing to school health programme, because, the design and development of school health programmes will require information at demographic characteristics of schoolchildren, and the major health burdens of the school-age group, the opportunities for intervention and the appropriateness of the available infrastructure [1,2].

The present study had three aims; first, to evaluate demographic features and intestinal parasitic infections among schoolchildren and second, to investigate sanitary conditions in the schools and third, to purpose of establishing intervention priorities in the Sanliurfa province of Turkey.

Methods

Study areas

Sanliurfa province is in an underdeveloped region of southern Turkey. The city is situated on a semi-arid plain at 550 m. It is on the crossroads between the Mediterranean, the Anatolian plateau, and Mesopotamia. The province situated semi-arid plain at 550 m. Average temperature is 18.1°C and minimal -12,4°C in February and maximal 46.5°C in August. Average annual relative humidity is 49% and rainfall is 463 mm. (Turkey Government Statistical Records, Annual Report-2000). In the province, main industrial structure is the south-eastern project (GAP), a massive dam and waterways project currently under construction. The GAP has attracted many people from rural areas migrating to the province. These people have usually inhabited shantytowns in the city outskirts and usually constructed mud-brick houses around a small central courtyard. In these areas, sanitary conditions are not good, with household liquid and rubbish accumulating in the streets. On the other hand, a part of residences have better socio-economic conditions and settled newly apartment buildings in the north of the city. Contrary to the shantytowns, apartment areas have a better sanitation condition. On the other hand, the rural area of province, there are many villages, which were scattered in a wide zone. The houses are constructed from stone walls coated with soil mixed straw and thatch roofs. The residences mainly grow cotton plantations with irrigated by GAP waterways. The number of population in the province 1.050.000. %51 of population are habitat in the urban city whereas 49% of them are resident in towns and villages in the rural areas (National census-2000). The urban areas of the province were composed of 66 districts with a population of 513575 (National census-2000). 43 of 66 districts (65.1%) are shantytowns where 63.6% of population live. The remaining 23 districts (34.8%) were belong to the apartment areas where 36.2% of the population are resident (The city municipality records-2000).

Selection of schools for baseline surveys

The study was carried out between October – November-2000. Three primary schools (p.s); Yakubiye p.s in the urban shantytown, Ziyaeddin Akbulut p.s in apartment building district and Hamurkesen p.s in Hamurkesen village in rural area were randomly selected for the study. In each school, all of the attended children were enrolled to the study in order to analyse children's demographic status. At the beginning of the study, the reasons for the surveys and the procedure for stool sample collection were

explained all of the children. A leaflet was distributed to the children for their parents to information about nature of study and consent. A plastic container marked with a identification number and with the name of subject was distributed to each children. One stool sample was collected from each child. Stool samples were examined within 12 h by cellophane thick smear method for the eggs of intestinal helminths (*Ascaris lumbricoides*, *Trichuris trichiura*, *Hymenolepis nana* and *Taenia species*) [11] and results were recorded on the child form. However, this study could not cover to the intensity of infection because materials such as templates for Kato-Katz quantitative test, did not find in Turkey.

A child form including each child's name, sex, age, school grade and parasitic infections was adapted from WHO [1] and used during surveys. The schoolchildren were divided into four groups according to their ages (7–8 years old, 9–10 years old, 11–12 years old and 13–14 years old) in each school to analyse their demographic characteristics.

The survey team also observed school's sanitation conditions during surveys. The condition of water supply, condition of latrines, presence of soaps on the basins and presence of garbage piles around to the school were inves-

tigated during survey and recorded on the school survey form.

Statistical analyses were performed with Epi info (CDC). The data were analysed by use of Chi-square test with Mantel Haenzstel test or Fisher's exact test where appropriate. P value <0.05 was considered significant. All children (infected or not infected) were treated with a single dose of 500 mg Mebendazole against *Ascaris* and *Trichuris* infections.

Results

Demographic status

A total of 1820 schoolchildren attended in three schools were analysed for demographic characteristics (Figure 1). The age distribution was not proportional in shantytown school which number of children was decreasing as their age's increase. The sex ratio was proportional until the second grade, after which the number of females gradually decreased in schoolchildren in the same school. In the rural school, schoolchildren was proportionally distributed between age groups but sex ratio was not proportional as the number of females gradually decreased as age rises. In apartment area, schoolchildren were proportionally distributed between age groups and gender even the high-grade students (Figure 1).

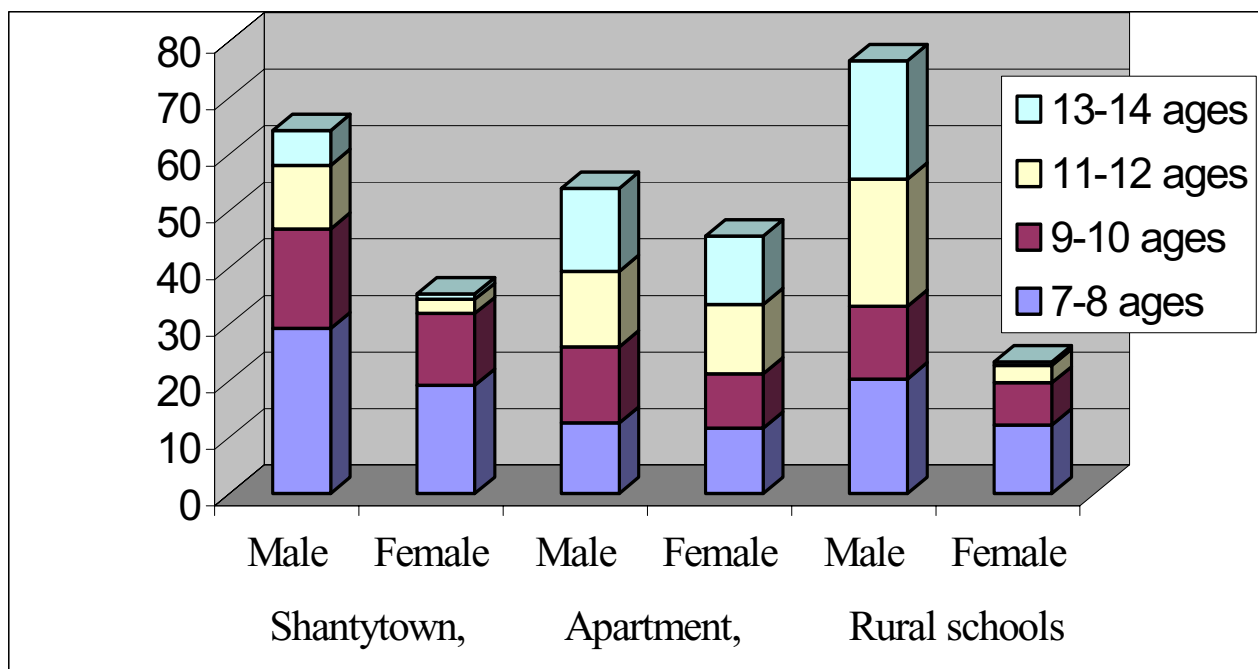


Figure 1
Demographic characteristics of children in shantytown, apartment and rural schools.

Table 1: Description of sanitation conditions in three schools

	Shantytown school	Apartment school	Rural school
Conditions of tap water	Two or three days/a week	Constant	Constant
Sanitation of latrines	Poor	Clean	Poor
Available soap on the basin	Absent	Present	Absent
Garbage around the school	Present	Absent	Present

Table 2: The prevalence of intestinal helminthic infections in Shantytown, apartment and rural schoolchildren

	Shantytown school (%)	Apartment school (%)	Rural school (%)	P value
Any infection	77.1	53.2	53.1	<0.001*
Double helminth infections	17.4	5.8	6.02	<0.001*
Triple helminth infections	1.1	0.1	0	0.05**
<i>Ascaris lumbricoides</i>	63.2	45.3	41.4	<0.001*
<i>Trichuris trichiura</i>	16.8	5.2	5.31	<0.001*
<i>Hymenolepis nana</i>	9.7	4.0	7.44	<0.001*
<i>Taenia species</i>	6.9	4.7	1.77	<0.001*

*P value was analysed by uncorrected test; **P value was analysed by Fisher's exact test

Sanitary conditions of schools

Available water supply, presence of garbage around the school, conditions in toilets and presence of soap on lavatories were different in three schools (Table 1). These conditions were poor in the schools in shantytown and rural areas, while, the school in apartment area was well sanitised. Water supply was inadequate and tap water was available only two or three days in a week in shantytown school. The survey team observed during the survey that when the water cut off, the school authorities closed to the toilets and some of the schoolchildren were returning their homes while some others defecated to the caves just outside of the shantytown school. The toilets were in poor conditions and there were no available soaps on the basins in the shantytown and rural schools. There were many garbage piles around to the shantytown school and schoolchildren were digging and playing on it (Table 1).

Parasitic infections

A total of 1820 stool containers were distributed and 80.2% of them were returned. The compliance was 89.8% in shantytown primary school (Yakubiye p.s), 81.7% in apartment primary school (Ziyaeddin Akbulut p.s) and 88.1% in rural primary school (Hamurkesen p.s). The compliance was higher among low-grade schoolchildren but it was decreasing among high-grade children in all study areas. 1460 schoolchildren were examined for intestinal helminth infection and 906 (62.0 %) of them were found to be infected with one or more helminth in all study areas. The prevalence of different kinds of helmin-

thic infections varied significantly among schoolchildren in three schools. 77.1% of schoolchildren in shantytown and 53.2 % of apartment district and 53.1% of rural area were infected by intestinal helminths. The double and triple infections were higher in shantytown than apartment and rural areas. *Ascaris* infections were most common in three schools. While the prevalence of *Trichuris* infections was higher among schoolchildren in shantytown and apartment than rural community, the prevalence of *Hymenolepis nana* infections was common than *Trichuris* infections in rural area. *Taenia* infections were more prevalent in among schoolchildren in shantytown and apartment district than rural area (Table 2).

The prevalence of infection was further analysed according the age and sex of schoolchildren (Table 3). There were no marked differences between prevalence of infection and age of schoolchildren in shantytown and rural area while infection rate was increasing as age's rise in apartment area ($P < 0.001$). There was no significant correlation between male and female schoolchildren to acquiring helminthic infections in all schools (Table 3).

Discussion

This survey investigated demographic and parasitic infections of schoolchildren and sanitation conditions in three primary schools in shantytown, apartment and rural areas. The evidence showed clearly that the burden of parasitic infections in schoolchildren and poor sanitation conditions of the shantytown school constituted public

Table 3: The prevalence of intestinal helminthic infections according to age groups and gender of children in the shantytown, apartment and rural schools

Age groups	Shantytown p.s. Prevalence (%)	Apartment p.s. Prevalence (%)	Rural p.s. Prevalence (%)
7-8	77.6	48.6	59.3
9-10	79.1	43.2	43.8
11-12	74.3	63.1	56.1
13-14	71.0	61.3	49.1
P value	0.6	<0.001	0.2
Male	78.2	53.25	50.0
Female	74.2	53.2	63.6
P value	0.4	0.2	0.2

health priority and strongly supports the needs of school health programmes aimed at reducing the prevalence of infections in schoolchildren and improving the sanitation conditions in and around of the schools. But, the demographic data indicated that proportion of schoolchildren benefiting from a school health programme will decline with increasing grade and female children will be increasingly disadvantaged in shantytown districts.

The demographic data indicated that the number of schoolchildren was gradually decreasing as their age's rise in shantytown school. It may be due to two reasons; first, the most of the shantytown residences are seasonal workers and all family members migrate to the cotton plantations between May and December every year [12]. Thus, some children start to attend their schools late in the year, whereas, some others may fail to attend school altogether. Second, the parents considered one or two year's education enough for literacy for their children in primary school and needed them in labour especially in low-income families. However, the schoolchildren attended their schools even to high grade in apartment and rural community. It may be due to the schoolchildren could find opportunity to attend in the school up to the high grade while working their lands in nearby village in the rural community. On the other hand, most of the residences have better socio-economic conditions in apartment community and they might aware about the education benefits in which their children would gain capabilities and skills. The second characteristic was the female children attended school less than the male children in shantytown and rural areas. Several socio-economic and behavioural reasons are involved in the female drop-out rate [5], but it is probable due to three reasons in this locality; first, parents considered two years of education to be enough for females to the literacy. Second, some parents might believe that female children should be dropped out from school when they enter puberty period. Third, some parents needed them for

domestic work, especially in the crowded families. However, in apartment area, the female children could have a chance for up to high-grade education. It is probable due to their parents insist female children should have opportunity to gain skills and capabilities for their future expectations like their male children. These demographic features were similar in schoolchildren in Chad, Mali, Ghana and Tanzania in Africa [13,14]. It is suggested that the school based health programmes offer the potential to reach significant numbers of population such as "school-health days" which may draw to children to receive treatment, even in countries with very low level of enrolment or high level of absenteeism or drop out rate [15].

This study indicated that prevalence of intestinal helminth infection was higher in shantytown school than apartment and rural school. It is expected, because, poor socio-economic status, poor hygienic habits and lack of sanitation prevailed intestinal helminth infections as suggested other studies [16,17]. Water supply was insufficient (two or three days/ in a week) and the toilets were in poor sanitised and no available soap on the lavatories. The survey team observed that when the water cut off, the school authorities closed toilets and some of the schoolchildren go to their home while some others defecate to the caves just outside of the schools. So, the children could not clean their hands due to lack of enough water in the school and not to developed hygienic attitudes. Also, garbage piles were accumulated around to the school and schoolchildren were digging and playing on it. Thus, the children may have exposed to additional risk for the transmission of infection in the shantytown school, which may explain high prevalence of intestinal worm infections. The schoolchildren in apartment area were suffered substantial infection rate (53%), although, their school was better sanitised and the parents were in better socio-economic conditions. This may be due to whole urban areas are in risk for infection because they were eating raw vegetables which were grown by night soil in the city [18].

This situation should be considered before deworming programme activation, because, if transmission routes (night soil usage in vegetable garden) would not be blocked, deworming programme could not produce successful outcomes with treatment of population only.

The survey also indicated that the rate of infection in rural school was significantly lower than urban shantytown school even similar worse sanitation conditions exist in both the school and the village except constant water supply. This finding is contrary to the other studies that found that the prevalence was higher in rural areas than urban areas [16,19]. This contradiction might be due to that the residences in rural area were far from serious social and economic problems existing in shantytowns in the urban city and children might clean hands with available water in the rural area. However, this should be clarified with further studies about children's hygiene behaviours and KAP (Knowledge, Attitudes and Practice) activities.

The surveys indicated intestinal helminth infections constituted public health priority among schoolchildren and targeted treatment was warranted at least two times a year [1,20,21]. A broad-spectrum benzimidazole (albendazole or mebendazole) will treat at least 60% of children infected *Ascaris* and *Trichuris* [22]. But, the prevalence of tapeworm infections was not exceed to 12% percent even in schoolchildren in shantytown community and their treatment could be delayed until the prevalence of overall helminth infections declined in certain level in which case management would be more advantageous [20]. The results also highlighted that any parasite control programme targeted at schoolchildren should cover all children enrolled in urban schools, because WHO guidelines for the evaluation of parasitic infection at the community level recommend targeted treatment for school-age children when the prevalence of infection exceeds 50 percent [1]. However, the schools in the rural population were distributed into wider zone that made impractical to deworming programme for logistic reasons. So, parasite control programme could be delayed for a certain time in rural areas.

Our study has certain limitations, inherit in the representatively of the selected sample. Result concerning schoolchildren in one school in each district should not be extended to the schoolchildren population living in the whole districts. Another sampling method taking a larger number of randomly selected schools for each of districts and for each school, sampling a number of randomly selected children of each sex for each age group is more appropriate for representation of whole districts. But we could not apply it because of technical limitations. Even though, the method selecting one school each district

might give some data which might help us to analyse the situation about helminth infections, sanitary conditions and demographic status. Obviously, the data showed that intestinal helminth infections was prevalent among schoolchildren in three different areas and a deworming programme was warranted. But, deworming itself will not sufficient to challenge with worm infections. There are important problems in front of deworming programme; night soil usage, poor water supply and poor sanitation conditions. Therefore, some measurements should be taken to prevent night soil usage for irrigation of vegetables in first. Second, the city municipality should supply constant water and collect garbage and wastes on time in the shantytown districts. Third, local health sector should collaborate with local educational sector and activate school health programme for delivering anthelmintics, health education and KAP (Knowledge, Attitudes and Practices) activities.

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