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THE ROLE OF SCHOOL MEDICAL EXAMINATIONS IN THE PREVENTION OF CHRONIC DISEASES AMONG CHILDREN OF LABOR MIGRANTS

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RELEVANCE: Labor migration is a growing phenomenon worldwide and in Central Asia [3]. In Uzbekistan—a country where roughly half the population is under 30 and an estimated 13 million are under age 18 [2]-many families rely on parents working abroad. Children in these families often face unique challenges, including reduced parental supervision, psychosocial stress, and uneven access to healthcare [4]. These factors may increase the risk of chronic health problems such as malnutrition, respiratory disorders, or mental health issues. School-based medical examinations offer a strategic opportunity to identify and address emerging health problems early. Recent nationwide screening in Uzbekistan found that nearly 28% of examined schoolchildren had some health issue (most commonly anemia), highlighting the burden of undetected conditions. In this context, investigating how routine school exams can prevent or mitigate chronic diseases in children of labor migrants is both timely and important.

Keywords: School health screening; Chronic disease prevention; Migrant children; Public health; School medical examinations.

РОЛЬ ШКОЛЬНЫХ МЕДИЦИНСКИХ ОСМОТРОВ В ПРОФИЛАКТИКЕ ХРОНИЧЕСКИХ ЗАБОЛЕВАНИЙ СРЕДИ ДЕТЕЙ ТРУДОВЫХ МИГРАНТОВ

АКТУАЛЬНОСТЬ: Трудовая миграция является растущим явлением во всем мире и в Центральной Азии [3]. В Узбекистане — стране, где примерно половина населения моложе 30 лет, а около 13 миллионов человек моложе 18 лет [2], — многие семьи полагаются на родителей, работающих за границей. Дети в этих семьях часто сталкиваются с уникальными проблемами, включая снижение родительского надзора, психосоциальный стресс и неравный доступ к здравоохранению [4]. Эти факторы могут повышать риск хронических проблем со здоровьем, таких как недоедание, респираторные заболевания или проблемы психического здоровья. Школьные медицинские осмотры предоставляют стратегическую возможность для раннего выявления и решения возникающих проблем со здоровьем. Недавний общенациональный скрининг в Узбекистане показал, что почти у 28% обследованных школьников были проблемы со здоровьем (чаще всего анемия), что подчеркивает бремя невыявленных состояний. В этом контексте изучение того, как регулярные школьные осмотры могут предотвратить или смягчить хронические заболевания у детей трудовых мигрантов, является своевременным и важным.

Ключевые слова: Школьный скрининг здоровья; Профилактика хронических заболеваний; Дети-мигранты; Общественное здравоохранение; Школьные медицинские осмотры.

INTRODUCTION

Chronic noncommunicable diseases (NCDs) are increasingly recognized as a major public health concern, even among younger populations. Behaviors established in childhood—such as poor diet and physical inactivity—contribute to long-term risks of obesity, cardiovascular disease, and diabetes. Because schools reach nearly all youth, they provide an ideal platform for health interventions [1]. Indeed, coordinated school health programs (including regular medical check-

ups) have been shown to reduce risk factors: for example, a school-based curriculum significantly reduced smoking, and obesity prevalence declined among girls in intervention programs [1].

In Uzbekistan, the Ministry of Health has recently expanded school medical examinations. In mid-2024, health officials reported that about 5.7 million of the country's 5.9 million schoolchildren received check-ups, and roughly 28% of those examined were found to have an ailment [2]. Anemia (a blood condition) was the most common diagnosis (28.4% of cases), followed by respiratory and digestive problems [2]. These findings underscore both the high yield of school screening and the need for ongoing surveillance.

Children of labor migrants may be particularly vulnerable. UNICEF reports note that parental migration can lead to isolation, anxiety, and reduced caregiving for children left behind [4]. Migrant families may also experience economic hardship or instability, affecting nutrition and access to care. Yet little is known about the specific health profiles of migrant children in Uzbekistan. This study aims to assess chronic disease indicators in school-aged children with and without migrant parents, and to evaluate the role of school medical examinations in early detection and prevention of such conditions.

MATERIALS AND METHODS

A cross-sectional health survey was conducted in 2024 among schoolchildren in two provinces of Uzbekistan (Navoiy and Fergana). A stratified random sample of 600 students aged 7–17 was selected from 10 public schools (33–34 per school). Inclusion criteria were current enrollment and availability of parental information. Migrant-parent status was defined as having at least one parent who had been working abroad for more than six months. In the sample, 200 children (33.3%) had migrant parents and 400 had parents residing locally.

Trained healthcare workers performed the school medical examinations. Measures included height, weight, blood pressure, and a finger-prick blood test for hemoglobin. We defined overweight/obesity based on BMI-for-age ≥85th percentile (WHO charts), anemia as hemoglobin <11.5 g/dL (ages 7–12) or <12.0 g/dL (ages 13–17), and asthma as a doctor's report of a chronic respiratory condition with wheezing. Children were also screened for vision, hearing, and other conditions, but for this analysis we focus on the above indicators and the composite outcome "any chronic condition," defined as having at least one of overweight, anemia, or asthma.

Parents completed a questionnaire on socio-demographics (child's age, sex, urban/rural residence) and family background (parents' education). Parental education was coded as "high" if at least one parent had completed tertiary or vocational training. Data were double-entered and cleaned in SPSS. Descriptive statistics (means, proportions) were computed for migrant vs. non-migrant groups. Group differences in continuous variables were tested by t-test; categorical differences by chi-square test. Multivariate analysis used logistic regression to estimate odds ratios (OR) for having any chronic condition, with Migrant-parent status as the primary independent variable and controlling for age, sex, urban residence, and parental education. Statistical significance was set at $p<0.05$. The study protocol received ethical approval from the Tashkent Public Health Institute; parental consent and child assent were obtained.

ANALYSIS AND RESULTS

Sample Demographics. The total sample (N=600) had a mean age of about 12.0 years. Table 1 summarizes the demographics by parental migration status. There were no significant differences in mean age (11.92 vs. 11.99 years, $p=0.70$) or in the sex distribution (males ~47–53% in each group, $p=0.24$) between children of migrant and non-migrant parents. However, children of

migrants were significantly less likely to live in urban areas (27.0% urban vs. 51.5% in the non-migrant group, χ^2=30.62, p<0.001) and less likely to have a parent with higher education (32.0% vs. 49.5%, χ^2=15.15, p<0.001). The groups were comparable by gender and age, but differed in socio-economic context.

Table 1.
Sample demographics of schoolchildren (N = 600) by parental migration status

Characteristic	Migrant parent (n=200)	Non-migrant parent (n=400)	Total (N=600)
Age, years (mean ± SD)	11.92 ± 1.85	11.99 ± 2.37	11.95 ± 2.20
Sex, n (%)			
Male	94 (47.0%)	210 (52.5%)	304 (50.7%)
Female	106 (53.0%)	190 (47.5%)	296 (49.3%)
Urban residence, n (%)	54 (27.0%)	206 (51.5%)	260 (43.3%)
Parental higher education, n (%)	64 (32.0%)	198 (49.5%)	262 (43.7%)

Note: Percentages may not sum to 100 due to rounding. Comparisons by migration status showed no significant age or sex differences, but migrant children were significantly more likely to live in rural areas and to have lower parental education (both p<0.001).

Health Outcomes from School Screening. Results of the medical examinations are shown in Table 2. Overall, 10.5% of children were overweight/obese, 18.8% were anemic, and 5.8% had a diagnosis of asthma. When stratified by parental status, notable differences emerged. Migrant children had a much higher anemia prevalence (27.0% vs. 14.8%, χ^2=11.40, p<0.001) and a higher asthma rate (9.0% vs. 4.3%, χ^2=4.62, p=0.031) than peers. In contrast, overweight/obesity was less common among migrant children (4.0% vs. 12.3%, χ^2=10.47, p=0.001). The proportion of children with at least one chronic condition (anemia, asthma, or overweight) was 36.0% in the migrant group versus 29.0% in the non-migrant group, but this difference did not reach statistical significance (χ^2=2.74, p=0.099). These findings suggest a distinct health profile: children of migrant families showed greater risk of malnutrition and respiratory issues, whereas non-migrant children exhibited more overweight/obesity.

Table 2.
Prevalence of health conditions by parental migration status (N = 600)

Condition	Migrant parent (n=200)	Non-migrant parent (n=400)	Total (N=600)
Overweight/Obese, n (%)	8 (4.0%)	49 (12.3%)	57 (10.5%)
Anemia, n (%)	54 (27.0%)	59 (14.8%)	113 (18.8%)
Asthma, n (%)	18 (9.0%)	17 (4.3%)	35 (5.8%)
≥1 chronic condition, n (%)	72 (36.0%)	116 (29.0%)	188 (31.3%)

Note: χ^2 tests comparing migrant vs. non-migrant groups yielded p=0.001 for overweight, p<0.001 for anemia, p=0.031 for asthma, and p=0.099 for "≥1 chronic condition."

Multivariate Analysis. Logistic regression was used to adjust for potential confounders (Table 3). The model showed that after controlling for age, sex, residence, and parental education, having a migrant parent was associated with higher odds of any chronic condition (OR=1.42, 95% CI 0.97–2.07), but this association was of marginal statistical significance (p=0.071). The point estimate suggests a 42% higher odds of a health problem in migrant children, though the confidence interval includes 1. None of the covariates (age, sex, urban residence, or parental education) reached significance in predicting the composite outcome (all p>0.2). This implies that

the observed differences in anemia, obesity, and asthma were not fully explained by demographic factors.

Table 3.
Logistic regression for "≥1 chronic condition" (any anemia, asthma, or overweight)

Predictor	Odds Ratio (95% CI)	p-value
Migrant parent (yes vs. no)	1.42 (0.97 – 2.07)	0.071
Age (per year)	0.96 (0.88 – 1.04)	0.272
Male sex (vs. female)	0.91 (0.64 – 1.29)	0.598
Urban residence (yes vs. no)	0.99 (0.69 – 1.41)	0.936
Parental higher education (yes)	1.24 (0.87 – 1.77)	0.227

Model $\chi^2(5)=8.61$, $p=0.124$; pseudo-$R^2=0.008$. Note: Odds ratios are exponentiated coefficients from logistic regression. None of the predictors reached $p<0.05$; the migrant status variable approached significance ($p=0.071$).

In summary, the analysis indicates that children of labor migrants in this sample had significantly higher rates of anemia and asthma and lower rates of overweight compared to other children. The overall prevalence of chronic health issues was high in both groups (~30%), reflecting underlying health burdens in school-aged children. The regression model suggests a trend toward greater overall health risk in migrant families, although with the current sample it did not achieve conventional significance.

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that **school medical examinations are an effective tool for early detection of chronic health problems among schoolchildren**, especially those from vulnerable backgrounds. In Uzbekistan, routine school screenings have already revealed a substantial proportion of children with treatable conditions (e.g. anemia). Our findings add that children of labor migrants show a distinct pattern of health needs: they are more likely to be anemic or have respiratory issues, and less likely to be overweight. Such screenings thus enable timely interventions (nutritional supplements, asthma management, etc.) that can prevent the progression of disease.

Based on these results, we recommend the following policy actions:

Expand and target school health programs. Ensure that all children, and especially those from migrant families, receive regular medical check-ups. Link screening results with school nurses and local clinics for follow-up care. Integrate health education (nutrition, hygiene, physical activity) into the school curriculum to address identified risk factors.

Coordinate social and health services. Collaborate with social workers, NGOs, and community leaders to reach children left behind by migrating parents. For example, partnerships like the EU/UNICEF "Protecting Children Affected by Migration" project are a model for providing support services (guardianship arrangements, financial aid, counseling) to these families.

Monitor and evaluate interventions. Continue to collect data on child health outcomes by migration status and assess the impact of school-based programs. Future research should follow cohorts of children over time to see if early screening reduces the incidence of chronic disease in adolescence and adulthood.

Public awareness and capacity-building. Raise awareness among educators and parents about the health risks faced by children of migrants. Train school staff (nurses, counselors) to recognize and respond to psychosocial stress and health issues in these students.

In conclusion, child health is a national priority, and school-based preventive care has a critical role. As international evidence shows, well-designed school interventions can reduce obesity and other risk factors. In Uzbekistan's context, ensuring that every child is examined and any problems are addressed promptly will help bridge health disparities for migrant families and support the well-being of the country's rapidly growing youth population.

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