

URBANIZAÇÃO, CONSCIÊNCIA E A CRESCENTE CARGA DAS DOENÇAS ALÉRGICAS EM CRIANÇAS: UMA AVALIAÇÃO DE SAÚDE PÚBLICA EM OSH, QUIRGUIZSTÃO

URBANIZATION, AWARENESS, AND THE RISING BURDEN OF ALLERGIC DISEASES IN CHILDREN: A PUBLIC HEALTH ASSESSMENT FROM OSH, KYRGYZSTAN

УРБАНИЗАЦИЯ, ОСВЕДОМЛЕННОСТЬ И РОСТ БРЕМЕНИ АЛЛЕРГИЧЕСКИХ ЗАБОЛЕВАНИЙ У ДЕТЕЙ: ОЦЕНКА ОБЩЕСТВЕННОГО ЗДОРОВЬЯ В ГОРОДЕ ОШ, КЫРГЫЗСТАН

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RESUMO

Introdução: As doenças alérgicas constituem uma crescente preocupação de saúde pública globalmente, impulsionadas pela urbanização, poluição ambiental e mudanças no estilo de vida. Compreender a consciência populacional e as tendências epidemiológicas de longo prazo é essencial para prevenção eficaz e organização dos cuidados de saúde. **Objetivo:** Determinar o papel da saúde pública no aprimoramento da organização dos cuidados médicos para doenças alérgicas na cidade de Osh, Quirguistão, considerando características epidemiológicas, acessibilidade e qualidade dos serviços médicos. **Métodos:** Foi conduzido um estudo transversal, incluindo uma pesquisa por questionário estruturado com 300 pacientes do Centro de Medicina Familiar de Osh (2023–2024) para avaliar a consciência sobre causas de alergia, fatores de risco, métodos de prevenção e fontes de informação. Paralelamente, foi realizada uma análise retrospectiva de dados oficiais de morbidade (2003–2023) para rinite alérgica, asma brônquica e dermatite atópica em diferentes faixas etárias. **Resultados:** A pesquisa revelou alta prevalência de doenças alérgicas (63,3% dos respondentes ou seus familiares). Poluição ambiental (25,0%), imunidade enfraquecida (21,7%) e hereditariedade (20,0%) foram identificados como os principais fatores de risco. A consciência sobre imunoterapia específica para alérgenos foi baixa (16,7%). Mídias sociais (30,0%), internet (28,3%) e médicos (26,7%) foram as principais fontes de informação. Os dados epidemiológicos mostraram uma tendência decrescente nas doenças alérgicas entre adultos ao longo de 20 anos, mas um aumento significativo entre crianças, especialmente para dermatite atópica e asma brônquica. **Discussão:** A divergência entre a melhoria dos resultados em adultos e o agravamento das tendências pediátricas destaca a necessidade de estratégias de saúde pública específicas por idade. A consciência limitada sobre métodos modernos de prevenção e o predomínio de fontes digitais de informação sublinham oportunidades para educação direcionada. **Conclusões:** Embora os resultados de saúde dos adultos

tenham melhorado, as crescentes taxas de alergia em crianças demandam intervenções urgentes de saúde pública. Fortalecer a alfabetização em saúde, aprimorar o papel dos provedores de cuidados primários e implementar programas ambientais e educacionais direcionados são essenciais.

Palavras-chave: *Saúde pública; asma brônquica; dermatite atópica; rinite alérgica; literacia em saúde; saúde infantil.*

ABSTRACT

Background: Allergic diseases are a growing concern in global public health. Urbanization, environmental pollution, and lifestyle changes contribute to this rise. Understanding what the population knows and how disease rates change over time is necessary for better prevention and healthcare planning. **Aim:** This study aimed to assess the role of public health in improving medical care for allergic diseases in Osh, Kyrgyzstan. We considered local epidemiological patterns, service accessibility, and quality of care. **Methods:** We used a cross-sectional design. A structured questionnaire was given to 300 patients at the Osh Family Medicine Center during 2023–2024. It covered causes of allergies, risk factors, prevention methods, and information sources. In parallel, we analyzed official morbidity data from 2003 to 2023 for allergic rhinitis, bronchial asthma, and atopic dermatitis across age groups. **Results:** The survey found a high prevalence of allergic diseases – 63.3% of respondents or their family members had allergies. Main risk factors identified by respondents were environmental pollution (25.0%), weakened immunity (21.7%), and heredity (20.0%). Only 16.7% knew about allergen-specific immunotherapy. Leading information sources were social media (30.0%), the internet (28.3%), and doctors (26.7%). Epidemiological data showed a decrease in allergic diseases among adults over 20 years, but a significant increase among children, especially for atopic dermatitis and bronchial asthma. **Discussion:** Adult outcomes have improved, but childhood allergy rates are rising. This suggests a need for age-specific public health strategies. Limited awareness of modern prevention and the dominance of digital information sources point to opportunities for targeted education. **Conclusions:** Rising allergy rates in children require urgent public health interventions. Better health literacy, stronger primary care involvement, and targeted environmental and educational programs are needed.

Keywords: *Public health; bronchial asthma; atopic dermatitis; allergic rhinitis; health literacy; children's health.*

АННОТАЦИЯ

Введение: Аллергические заболевания представляют собой растущую проблему общественного здравоохранения во всем мире, обусловленную урбанизацией, загрязнением окружающей среды и изменением образа жизни. Понимание информированности населения и долгосрочных эпидемиологических тенденций необходимо для эффективной профилактики и организации медицинской помощи. **Цель:** Определить роль общественного здоровья в совершенствовании организации медицинской помощи при аллергических заболеваниях на примере города Ош, Кыргызстан, с учетом эпидемиологических особенностей, доступности и качества медицинских услуг. **Методы:** Проведено поперечное исследование, включавшее анкетирование 300 пациентов Центра семейной медицины города Ош (2023–2024) для оценки информированности о причинах аллергии, факторах риска, методах профилактики и источниках информации. Параллельно проведен ретроспективный анализ официальных данных заболеваемости (2003–2023) по аллергическому риниту, бронхиальной астме и атопическому дерматиту в разных возрастных группах. **Результаты:** Анкетирование выявило высокую распространенность аллергических заболеваний (63,3% респондентов или членов их семей). Загрязнение окружающей среды (25,0%), ослабленный иммунитет (21,7%) и наследственность (20,0%) были определены как основные факторы риска. Осведомленность об аллерген-специфической иммунотерапии была низкой (16,7%). Основными источниками информации стали социальные сети (30,0%), интернет (28,3%) и врачи (26,7%). Эпидемиологические данные показали снижение заболеваемости аллергическими болезнями среди взрослых за 20 лет, но значительный рост среди детей, особенно по атопическому дерматиту и бронхиальной астме. **Обсуждение:** Расхождение между улучшением показателей у взрослых и ухудшением у детей подчеркивает необходимость возрастных стратегий общественного здоровья. Ограниченная осведомленность о современных методах профилактики и доминирование цифровых источников информации указывают на возможности для целенаправленного просвещения. **Выводы:** Несмотря на улучшение здоровья взрослых, рост аллергических заболеваний у детей требует неотложных мер общественного здравоохранения. Укрепление санитарной грамотности, усиление роли первичного звена и реализация целевых экологических и образовательных программ являются необходимыми.

Ключевые слова: *Общественное здоровье; бронхиальная астма; атопический дерматит;*

1. INTRODUCTION:

Allergic diseases are among the leading public health challenges. Worldwide, an estimated 30-40% of people suffer from some form of allergy (World Health Organization, 2021; Pawankar et al., 2020). Conditions like allergic rhinitis, bronchial asthma, atopic dermatitis, and food allergies lower quality of life and create large economic costs for health systems. According to the Global Burden of Disease Study, about 262 million people have asthma and more than 400 million have allergic rhinitis (GBD 2019 Asthma Collaborators, 2022). Atopic dermatitis is one of the most common chronic skin diseases in childhood; in some urban areas its prevalence exceeds 20% (Langan et al., 2020).

Several factors explain the rising allergy burden. Urbanization, environmental pollution, changes in diet, reduced microbial exposure (the “hygiene hypothesis”), and climate change all play a role (Akdis, 2021; Cecchi et al., 2021). Low- and middle-income countries are urbanizing quickly, often faster than their healthcare infrastructure can adapt (Serebrisky & Wohl, 2021).

Central Asia, including the Kyrgyz Republic, is no exception. Osh, the second largest city, illustrates these trends well. With a population of over 300,000, the city has high levels of particulate matter, seasonal pollen peaks, and dense motor traffic – all factors that increase the risk of respiratory and allergic diseases (Toktogulova et al., 2020; Semernik et al., 2023). Economic constraints also limit access to specialized allergy services and modern therapies, such as allergen-specific immunotherapy (Moldobaeva et al., 2022).

Public health strategies for allergic diseases emphasize primary prevention, early diagnosis, and patient education (GINA, 2021; EAACI, 2022). A key element is health literacy – the ability to obtain, understand, and use health information (Nutbeam & Lloyd, 2021). Poor health literacy is linked to worse disease control, more emergency visits, and underuse of preventive treatments (Wood et al., 2020). Yet few studies have examined public awareness of allergic diseases in Central Asian cities.

In Kyrgyzstan, most previous research

focused on clinical descriptions or simple epidemiological counts. Little attention has been given to population knowledge, attitudes, and practices about allergy prevention (Sulaimanov et al., 2024; Annayeva, 2025). No study has combined a community awareness survey with a long-term (20-year) trend analysis of allergic disease incidence in Osh. This gap makes it hard to design evidence-based public health interventions.

We therefore addressed two questions: (1) What is the level of public awareness about causes, risk factors, and prevention of allergic diseases among patients attending primary care in Osh?

(2) How have allergic disease incidence rates changed from 2003 to 2023 across different age groups, especially children? We hypothesized that despite high disease burden, public awareness of modern preventive methods is low, and the gap between adult improvement and pediatric worsening calls for targeted action.

1.1. Aims

The primary aim was to determine the role of public health in improving allergy care in Osh, taking into account epidemiological factors, accessibility, and service quality. Secondary aims were to measure public awareness, describe 20-year incidence trends by age, and develop practical recommendations for prevention and care.

2. MATERIALS AND METHODS:

2.1. Materials

2.1.1. Study Design and Setting

We used a descriptive, cross-sectional, and analytical design. The study took place in Osh, Kyrgyz Republic, during 2023–2024. It had two parts: a patient survey and a retrospective analysis of official morbidity data over 20 years.

2.1.2. Survey Participants

We enrolled 300 adult patients (≥18 years) who visited the Osh Family Medicine Center, a primary care facility serving a mixed urban population. Patients were recruited consecutively during routine visits. Inclusion criteria were age ≥18 years, ability to complete the questionnaire, and voluntary consent. Inability to complete the questionnaire was the only exclusion criterion.

2.1.3. Questionnaire Instrument

Our team developed a structured questionnaire based on relevant literature and international allergy guidelines (GINA, 2021; EAACI, 2022). We pilot-tested it on 30 patients to assess clarity and face validity, then made minor wording adjustments. The final version had four sections:

- Section A: age and gender.
- Section B: awareness of allergy causes and risk factors (multiple choice, multiple answers allowed).
- Section C: knowledge of allergy prevention methods.
- Section D: sources of information about allergic diseases.

Questionnaires were anonymous. Completion took about 10-15 minutes.

2.1.4. Epidemiological Data Source

We obtained official statistical data from the Center for Electronic Healthcare of the Ministry of Health of the Kyrgyz Republic for the period 2003–2023. The data covered three disease categories: allergic rhinitis (hay fever), bronchial asthma, and atopic dermatitis with related conditions. Incidence indicators were extracted separately for adults/adolescents (≥ 15 years) and children under 14 years. Rates were calculated as absolute numbers and per 100,000 population.

2.2. Methods

2.2.1. Data Collection

Trained medical staff (interviewers) collected the surveys at the Osh Family Medicine Center from January 2023 to December 2024. After obtaining informed consent, interviewers helped participants complete the questionnaire to reduce literacy-related barriers.

2.2.2. Statistical Analysis

We used descriptive statistics: absolute frequencies (n) and relative frequencies (%). For epidemiological data, we computed incidence rates per 100,000 population per year. Group comparisons (e.g., awareness by age) used chi-square tests, with significance set at $\alpha = 0.05$. All analyses were performed with SPSS version 29.0 (IBM Corp., Armonk, NY, USA).

2.2.3. Data Availability

Raw data are available from the corresponding author upon reasonable request.

Summary data are presented in the tables and figures of this manuscript.

3. RESULTS AND DISCUSSION:

3.1. Results

3.1.1. Characteristics of respondents

Of the 300 participants, 180 (60.0%) were women and 120 (40.0%) were men. Most participants (245, 81.7%) were of working age (18-59 years). The largest age group was 30-44 years (95, 31.7%), followed by 45-59 years (80, 26.7%), 18-29 years (70, 23.3%), and ≥ 60 years (55, 18.3%).

3.1.2. Prevalence of Allergic Diseases

A total of 190 respondents (63.3%) reported having an allergic disease themselves or in a family member. The remaining 110 (36.7%) reported no allergies. The difference was significant ($\chi^2 = 21.3$, $p < 0.001$).

3.1.3. Awareness of Allergy Causes and Risk Factors

When asked about causes of allergies, the most frequent answers were environmental pollution (75, 25.0%), weakened immunity (65, 21.7%), heredity (60, 20.0%), poor diet (50, 16.7%), and frequent medication use (40, 13.3%). "Other" causes were mentioned by 10 (3.3%). The top three causes accounted for 66.7% of all responses.

Risk factor awareness showed a similar pattern (Table 1). Environmental pollution was named by 75 (25.0%), weakened immunity by 65 (21.7%), heredity by 60 (20.0%), poor diet by 50 (16.7%), and frequent medication use by 40 (13.3%). Other factors were named by 10 (3.3%).

Table 1. Awareness of allergy risk factors among survey participants ($n=300$).

3.1.4. Knowledge of Allergy Prevention Methods

Avoiding contact with allergens was the most recognized preventive measure (80, 26.7%), followed by regular cleaning (70, 23.3%). Only 50 (16.7%) mentioned allergen-specific immunotherapy (ASIT). Healthy eating was named by 45 (15.0%), and strengthening the immune system by 40 (13.3%). Other methods were noted by 15 (5.0%) (Table 2).

Table 2. Awareness of allergy prevention methods among survey participants ($n=300$).

3.1.5. Sources of Information About Allergic Diseases

Social media was the most frequently cited source (90, 30.0%), followed by the internet (85, 28.3%), and doctors (80, 26.7%). Television accounted for 25 (8.3%), newspapers/magazines for 10 (3.3%), and other sources for 10 (3.3%) (Table 3). Digital sources (social media and the internet) accounted for 58.3%.

Table 3. Sources of information about allergic diseases among survey participants (n=300).

3.1.6. Long-term Trends in Allergic Disease Incidence (2003–2023)

The official data revealed opposite trends between adults and children (Table 4). Over the 20 years, incidence rates of allergic diseases decreased substantially among adults and adolescents, but increased among children.

- **Respiratory diseases:** Among adults/adolescents, the incidence rate fell from 18,055.9 per 100,000 in 2003 to 4,497.3 per 100,000 in 2023 (a 75.1% reduction). In children, the incidence rose from 5,244.7 to 15,936.5 per 100,000 (a 204% increase).
- **Allergic rhinitis:** Adult/adolescent rates declined from 384.8 to 68.3 per 100,000 (82.2% reduction). Child rates decreased from 81.0 to 64.7 per 100,000 (20.1% decrease), but there were fluctuations, with a higher rate in 2013.
- **Bronchial asthma:** Adult/adolescent rates declined from 142.3 to 60.7 per 100,000 (57.4% reduction). In children, rates increased from 41.5 to 82.8 per 100,000 (99.5% increase).
- **Atopic dermatitis and related conditions:** Adult/adolescent rates declined from 165.6 to 75.0 per 100,000 (54.7% reduction). In children, rates increased from 138.8 to 163.9 per 100,000 (18.1% increase).

The most concerning changes were for atopic dermatitis and bronchial asthma in children, where incidence more than doubled.

Table 4. Incidence of allergic diseases in Osh city (2003–2023), rates per 100,000 population.

3.2. Discussion

This study provides a combined picture of public awareness and long-term allergy trends in Osh. The results show a split pattern: adults have seen real improvements over 20 years, but children have not. At the same time, public knowledge about allergy causes is decent, but knowledge of modern prevention – especially allergen-specific immunotherapy – is low. People rely more on digital media than on doctors for information.

3.2.1. Public Awareness of Allergic Diseases

The 63.3% of respondents reporting allergies in themselves or family members is higher than the official rates in Table 4. This is likely because our survey captured both diagnosed and undiagnosed cases, plus family history. The gap suggests underdiagnosis or underreporting in routine statistics, which calls for better diagnostic capacity in primary care.

Most respondents correctly identified environmental pollution, weakened immunity, and heredity as major risk factors. This basic understanding is encouraging. Pollution, mentioned by a quarter of respondents, is a real concern in Osh's urban environment (Toktogulova et al., 2020). Heredity (20%) matches the well-known genetic component of atopy (Langan et al., 2020). However, fewer people recognized poor diet and frequent medication use as risk factors, suggesting areas where health education could be improved.

A critical knowledge gap is the low awareness of ASIT – only 16.7%. ASIT is a disease-modifying treatment that can prevent progression from allergic rhinitis to asthma and provide long-term tolerance (GINA, 2021; EAACI, 2022). The low awareness probably reflects limited patient education and poor availability of this therapy in Kyrgyzstan's public system (Moldobaeva et al., 2022). Both clinicians and the public need more information about ASIT.

3.2.2. Information Sources and Health Literacy

The finding that social media (30%) and the internet (28.3%) are the top information sources aligns with global trends in digital health information seeking (Wood et al., 2020). Digital platforms offer a wide reach but also carry the risk of misinformation. Only 26.7% of respondents cited doctors as a source. This suggests that clinical encounters are underused for patient education. Patients with allergic diseases need ongoing advice on trigger avoidance, medication adherence, and recognizing exacerbations.

Structured patient education in primary care could improve disease control (Nutbeam & Lloyd, 2021). Short educational sessions, written materials, and trusted digital channels (e.g., clinic social media) could help close the gap.

3.2.3. Divergent Epidemiological Trends: Adults vs. Children

The drop in allergic disease rates among adults is a positive sign. Better medical care, more accurate diagnosis, and greater awareness of allergen avoidance likely contributed. For asthma, wider use of inhaled corticosteroids may have helped (GINA, 2021). For allergic rhinitis and atopic dermatitis, better treatments and self-management could explain the improvement.

By contrast, children have seen a clear rise in allergic diseases, especially atopic dermatitis and bronchial asthma. Atopic dermatitis in children went from 138.8 to 163.9 per 100,000; asthma from 41.5 to 82.8 per 100,000. This matches global reports of increasing childhood allergies in urbanizing settings (Akdis, 2021; Cecchi et al., 2021). Several factors may explain the increase. First, environmental exposures: Osh's growth has increased traffic emissions, construction dust, and industrial activity, raising particulate matter and allergen levels (Semernik et al., 2023). Children's developing immune systems are more vulnerable. Second, lifestyle changes: less physical activity, more time indoors, and dietary shifts toward processed foods may promote inflammation and reduce microbial exposure – the hygiene hypothesis (Serebrisky & Wohl, 2021). Third, early-life factors such as limited breastfeeding or inappropriate weaning could contribute, though we did not measure them. Fourth, increased awareness among pediatricians and parents might have led to better detection, but the consistency across multiple disease categories suggests a true epidemiological rise.

These divergent trends tell us that we cannot use the same public health strategy for children as for adults. Pediatric prevention needs its own focus.

3.2.4. Public Health Implications

Our findings have several practical implications for Osh and similar Central Asian cities. First, the rising childhood allergy burden calls for targeted prevention programs. These could include environmental measures (monitoring and reducing air pollution, controlling indoor allergens in schools and kindergartens), early diagnosis (adding allergy screening to routine pediatric visits for children with a family history of atopy), and parental education about

allergen avoidance and weaning practices.

Second, limited awareness of modern prevention strategies (such as ASIT) suggests that continuing medical education for primary care physicians should include updates on allergy management. Referral pathways to allergists should be established where possible, and public funding for ASIT should be explored.

Third, the dominance of digital media offers an opportunity: health authorities can engage with the public through social media, using clinic-affiliated channels or trusted local influencers to share accurate content. Proactive digital health literacy campaigns are needed to counter misinformation.

Finally, progress in adult allergic disease control should not lead to complacency. Monitoring of emerging risks (e.g., climate-related pollen changes) and continued access to effective treatments are essential.

4. CONCLUSIONS:

Allergic diseases are very common in Osh, especially in children. Adult rates have decreased by **57–82%** over the past 20 years (depending on the disease category), likely due to better medical care and increased awareness, likely due to better medical care and increased awareness. Child rates, however, have increased – most notably for atopic dermatitis and bronchial asthma. Public awareness of risk factors such as pollution and heredity is good, but knowledge of modern preventive methods (allergen-specific immunotherapy) remains low. Most people get information from digital media rather than doctors. The following priorities emerge for public health action:

- Strengthen primary prevention in children through environmental improvements (air quality monitoring, indoor allergen control) and parent education about early-life risk factors.
- Increase health literacy by incorporating allergy education into routine primary care consultations and using trusted digital platforms to spread evidence-based information.
- Improve access to modern therapies (allergen-specific immunotherapy) by raising clinician awareness and exploring sustainable funding mechanisms.
- Maintain adult disease control by preserving access to effective treatments and watching for emerging environmental threats.

Addressing the rising burden of childhood allergies will require coordinated work across the health, environmental, and education sectors. This study provides baseline data for targeted intervention design and highlights the important role of public health in Central Asian cities.

5. DECLARATIONS

5.1. Study Limitations

Several limitations should be considered. Our survey was done at a single family medicine center, so results may not apply to all of Osh. Convenience sampling may have introduced selection bias. We relied on self-reports, which are subject to recall and social desirability bias; we did not clinically confirm allergic diseases. The cross-sectional design does not allow causal inferences. The retrospective epidemiological analysis over 20 years may be affected by changes in diagnostic criteria and reporting practices. The questionnaire was not formally validated against a gold standard. We did not collect data on socioeconomic status, education level, or detailed environmental exposures, which could confound the results.

Additionally, the 2013 incidence data for several disease categories (e.g., respiratory diseases in adults, bronchial asthma and atopic dermatitis in children) show non-monotonic patterns that deviate from the overall 20-year trends. These anomalies likely reflect a systemic change in diagnostic criteria, disease coding (e.g., transition between ICD revisions), or data collection methodology within the Kyrgyz healthcare system around 2013, rather than true epidemiological fluctuations. Direct comparisons between 2003 and 2023 remain valid for assessing long-term trends, but intermediate year values should be interpreted with caution. This limitation is now explicitly acknowledged.

5.2. Acknowledgments

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resources.

In accordance with the ethical guidelines of the Periódico Tchê Química, which do not allow donations from authors with manuscripts under evaluation (even when research funds are available), or in cases of authors' financial constraints, publication costs were fully absorbed by the journal under our Platinum Open Access policy, through the support of the Araucária Scientific Association (<https://acaria.org/>). This policy aims to ensure complete independence between the editorial process and any financial aspects, reinforcing our commitment to scientific integrity and equity in knowledge dissemination.

5.4. Conflicts of Interest

The authors declare no conflicts of interest.

5.5. Data Availability

Raw data are available upon request from the corresponding author, aldashukurov@oshsu.kg, due to participant confidentiality.

5.6. Author Contributions

Zarema A. Boronchieva: study conception and design, manuscript editing, supervision, final approval.

Yrysbek A. Aldashukurov: manuscript editing, final approval.

Aichurok S. Amirakulova: data collection, literature review, data analysis and interpretation, manuscript writing, final approval.

Turdaali Galalov: literature review, data processing, final approval.

Bektur A. Abdymanapov: literature review, data processing, final approval.

Orozgul Jalalova: literature review, data processing, final approval.

Nurgul A. Alimova: literature review, data processing, final approval.

5.7. AI and Computational Tools Declaration

After completing the full draft, the authors used ChatGPT 4.0 (OpenAI) only for minor grammar and language correction. The tool was applied to less than 10% of the text (mostly fixing awkward phrasing). No AI was used for data generation, statistical analysis, result interpretation, or scientific decision-making. All content was reviewed and approved by the

authors.

5.8. Research Integrity Declaration

The authors certify that this research meets the standards of research integrity: no data fabrication, no results falsification, no p-hacking or selective reporting, original work not previously published, and methods conducted ethically.

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6. STUDIES INVOLVING HUMAN AND

ANIMAL SUBJECTS

6.1. Ethical Approval

This study was approved by the Ethics Committee of the Southern Branch of the Research Institute of Medical and Biological Problems, National Academy of Sciences of the Kyrgyz Republic (Protocol No. 6, dated February 14, 2023). The study was conducted in accordance with the Declaration of Helsinki. A digitized copy of the ethics approval letter is provided as Supplementary Material.

6.2. Informed Consent

Written informed consent was obtained from all 300 participants prior to data collection. Participants were informed about the study purpose, procedures, risks, and benefits. Data were collected anonymously, and all personal identifiers were removed to protect participant confidentiality.

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Table 1. Awareness of allergy risk factors among survey participants (n=300).

Risk factor	n	% of total responses
Environmental pollution	75	25.0
Weakened immunity	65	21.7
Heredity	60	20.0
Poor diet	50	16.7
Frequent medication use	40	13.3
Other	10	3.3
Total	300	100

Table 2. Awareness of allergy prevention methods among survey participants (n=300).

Prevention method	n	% of total responses
Avoiding contact with allergens	80	26.7
Regular cleaning of premises	70	23.3
Allergen-specific immunotherapy	50	16.7
Healthy eating	45	15.0
Strengthening the immune system	40	13.3
Other	15	5.0
Total	300	100

Table 3. Sources of information about allergic diseases among survey participants (n=300).

Information source	n	% of total responses
Social media	90	30.0
Internet	85	28.3
Doctors	80	26.7
Television	25	8.3
Newspapers/magazines	10	3.3
Other	10	3.3
Total	300	100

Table 4. Incidence of allergic diseases in Osh city (2003–2023), rates per 100,000 population.

Disease class	Year	Adults & adolescents	Children (<14 years)
Respiratory diseases	2003	18,055.9	5,244.7
	2013	26,103.5	3,719.8
	2023	4,497.3	15,936.5
Allergic rhinitis	2003	384.8	81.0
	2013	143.5	101.8
	2023	68.3	64.7
Bronchial asthma	2003	142.3	41.5
	2013	157.7	20.0
	2023	60.7	82.8
Atopic dermatitis	2003	165.6	138.8
	2013	52.2	36.9
	2023	75.0	163.9

Source: Center for Electronic Healthcare, Ministry of Health of the Kyrgyz Republic.

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