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CURRENT STATE OF INTESTINAL YERSINIOSIS IN THE REPUBLIC OF KAZAKHSTAN: EPIDEMIOLOGICAL TRENDS AND CHALLENGES, 2020 - 2024

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Introduction. Intestinal yersiniosis remains a foodborne and zoonotic infection of public-health relevance, while its registered incidence in Kazakhstan is low and varies from year to year.
Objective. To describe the temporal, age-related, and territorial patterns of registered intestinal yersiniosis in the Republic of Kazakhstan during 2020–2024 and to place the national findings in an international epidemiological context.
Materials and Methods. A retrospective descriptive epidemiological analysis was performed using official surveillance data for 2020 - 2024. Annual case counts, incidence rates per 100,000 population, age-specific indicators, and available territorial distributions were summarized. A narrative review of PubMed, MEDLINE, Springer, and Google Scholar sources was used for international comparison.
Results. The annual number of registered cases was 4 in 2020, 8 in 2021, 29 in 2022, 11 in 2023, and 17 in 2024. The highest annual count occurred in 2022. Children younger than 14 years accounted for 23 of 29 cases in 2022 and 10 of 11 cases in 2023, whereas 3 such cases were reported in 2024. In 2020–2021, Almaty accounted for the largest share of registered cases among the regions for which distribution was reported.
Discussion. The data indicate low absolute incidence but marked year-to-year variability. Small case numbers make percentage changes unstable and limit inference about sustained national trends. Differences between Kazakhstan and countries with higher reported incidence may partly reflect variation in surveillance intensity and laboratory diagnostics.
Conclusion. Kazakhstan requires continued epidemiological surveillance of intestinal yersiniosis, improved laboratory detection, consistent regional reporting, and targeted prevention, with particular attention to pediatric cases and areas where infections are repeatedly registered.
Keywords: yersiniosis; Yersinia enterocolitica; epidemiology; incidence; surveillance; children; Kazakhstan

СОВРЕМЕННОЕ СОСТОЯНИЕ КИШЕЧНОГО ИЕРСИНИОЗА В РЕСПУБЛИКЕ КАЗАХСТАН: ЭПИДЕМИОЛОГИЧЕСКИЕ ТЕНДЕНЦИИ И ВЫЗОВЫ, 2020 - 2024 гг.

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Введение. Кишечный иерсиниоз сохраняет значение как пищевая и зоонозная инфекция, при этом регистрируемая заболеваемость в Казахстане остается низкой и заметно колеблется по годам.
Цель. Охарактеризовать временные, возрастные и территориальные особенности зарегистрированной заболеваемости кишечным иерсиниозом в Республике Казахстан в 2020 –2024 гг. и сопоставить национальные данные с международным эпидемиологическим контекстом.
Материалы и методы. Проведен ретроспективный описательный эпидемиологический анализ официальных данных санитарно-эпидемиологического надзора за 2020–2024 гг. Оценивали число случаев, показатели заболеваемости на 100 тыс. населения, возрастные показатели и доступное территориальное распределение. Для международного сопоставления выполнен нарративный поиск публикаций в PubMed, MEDLINE, Springer и Google Scholar.

Результаты. В 2020 г. зарегистрировано 4 случая, в 2021 г. - 8, в 2022 г. - 29, в 2023 г. - 11, в 2024 г. - 17. Максимальное число случаев пришлось на 2022 г. Среди детей младше 14 лет зарегистрировано 23 из 29 случаев в 2022 г. и 10 из 11 случаев в 2023 г.; в 2024 г. в этой возрастной группе отмечено 3 случая. В 2020 - 2021 гг. наибольшая доля зарегистрированных случаев приходилась на Алматы среди территорий, для которых были представлены данные.
Обсуждение. Полученные данные свидетельствуют о низком абсолютном уровне заболеваемости при выраженной межгодовой вариабельности. При небольшом числе случаев относительные изменения нестабильны, что ограничивает выводы о стойких долгосрочных тенденциях. Различия с зарубежными странами могут частично отражать неодинаковую интенсивность эпидемиологического надзора и лабораторной диагностики.
Заключение. Необходимы непрерывный эпидемиологический надзор за кишечным иерсиниозом, совершенствование лабораторной диагностики, унификация региональной отчетности и риск-ориентированные профилактические меры, особенно в отношении детского населения и территорий с повторной регистрацией случаев.
Ключевые слова: иерсиниоз; Yersinia enterocolitica; эпидемиология; заболеваемость; эпидемиологический надзор; дети; Казахстан

ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ ІШЕК ИЕРСИНИОЗЫНЫҢ ҚАЗІРГІ ЖАҒДАЙЫ: ЭПИДЕМИОЛОГИЯЛЫҚ ҮРДІСТЕР МЕН МӘСЕЛЕЛЕР, 2020 - 2024 жж.

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Кіріспе. Ішек иерсиниозы тағам арқылы таралатын және зооноздық инфекция ретінде қоғамдық денсаулық сақтау үшін өзектілігін сақтайды, ал Қазақстанда тіркелетін сырқаттанушылық деңгейі төмен болғанымен, жылдар бойынша айқын өзгеріп отырады.
Мақсаты. 2020–2024 жылдары Қазақстан Республикасында тіркелген ішек иерсиниозының уақыттық, жас ерекшелігіне байланысты және аумақтық заңдылықтарын сипаттау және ұлттық деректерді халықаралық эпидемиологиялық жағдаймен салыстыру.
Материалдар мен әдістер. 2020–2024 жылдарға арналған ресми санитариялық-эпидемиологиялық қадағалау деректеріне ретроспективті сипаттамалық эпидемиологиялық талдау жүргізілді. Жылдық жағдай саны, 100 мың тұрғынға шаққандағы сырқаттанушылық, жасқа байланысты көрсеткіштер және қолжетімді аумақтық таралу бағаланды. Халықаралық салыстыру үшін PubMed, MEDLINE, Springer және Google Scholar дереккөздеріне нарративтік іздеу жүргізілді.
Нәтижелер. 2020 жылы 4 жағдай, 2021 жылы 8, 2022 жылы 29, 2023 жылы 11 және 2024 жылы 17 жағдай тіркелді. Ең жоғары жылдық көрсеткіш 2022 жылы байқалды. 14 жасқа дейінгі балалар арасында 2022 жылы 29 жағдайдың 23-і, 2023 жылы 11 жағдайдың 10-ы тіркелді, ал 2024 жылы осы жас тобында 3 жағдай анықталды. 2020–2021 жылдары аумақтық деректер берілген өңірлердің ішінде тіркелген жағдайлардың ең үлкен үлесі Алматы қаласына тиесілі болды.
Талқылау. Деректер сырқаттанушылықтың абсолюттік деңгейі төмен болғанымен, жылдар арасындағы өзгергіштіктің айқын екенін көрсетеді. Жағдай саны аз болғандықтан, салыстырмалы өзгерістер тұрақсыз және ұзақ мерзімді тұрақты үрдістер туралы қорытынды жасауға мүмкіндік шектеулі. Қазақстан мен сырқаттанушылық көрсеткіші жоғары елдер арасындағы айырмашылықтар эпидемиологиялық қадағалау мен зертханалық диагностиканың қарқындылығына ішінара байланысты болуы мүмкін.
Қорытынды. Қазақстанда ішек иерсиниозына тұрақты эпидемиологиялық қадағалау жүргізу, зертханалық анықтауды жетілдіру, өңірлік есептілікті біріздендіру және қауіпке бағдарланған профилактикалық шараларды іске асыру қажет, әсіресе балалар мен қайталама жағдайлар тіркелетін аумақтарға назар аудару маңызды.
Түйінді сөздер: иерсиниоз; Yersinia enterocolitica; эпидемиология; сырқаттанушылық; эпидемиологиялық қадағалау; балалар; Қазақстан

Introduction

The enteropathogenic species Yersinia enterocolitica is epidemiologically important because it can persist in both biotic and abiotic environments while retaining pathogenic potential and can cause sporadic cases as well as outbreaks [1].

Yersiniosis has been investigated across North and South America, Europe, Scandinavia, Africa, Russia, China, South Korea, Japan, and Israel, reflecting the broad geographic distribution of the infection and the continuing need for surveillance [2].

The disease also has public-health and economic implications through healthcare and veterinary costs, livestock losses, trade restrictions, food recalls, and regulatory measures. In 2022, yersiniosis was reported as the fourth most common gastrointestinal infection in the EU/EEA, with 8,037 confirmed cases in 27 countries [3, 4].

Despite the international body of surveillance data, recent national descriptions of intestinal yersiniosis in Kazakhstan remain limited. A five-year synthesis of official surveillance indicators can help clarify whether the observed burden is concentrated in particular years, age groups, or territories and can identify weaknesses in routine monitoring.

Objective. To characterize temporal, age-related, and territorial patterns of registered intestinal yersiniosis in Kazakhstan during 2020–2024 and to interpret these findings in the context of international epidemiological data.

Scientific novelty and practical significance

The novelty of the study is primarily national and epidemiological: it consolidates five consecutive years of official surveillance data on intestinal yersiniosis in Kazakhstan and considers annual dynamics together with the available age and territorial structure. The work does not propose a new analytical method; its value lies in identifying practical surveillance priorities and in highlighting the limits of interpretation when case numbers are small and regional reporting is incomplete.

For public-health practice, the findings support more consistent laboratory confirmation, harmonized regional reporting, and closer attention to pediatric cases. These measures are important both for improving detection and for distinguishing genuine changes in transmission from fluctuations caused by diagnostic and reporting practices.

Materials and Methods

This retrospective descriptive epidemiological study analyzed official surveillance data on intestinal yersiniosis in the Republic of Kazakhstan for 2020–2024. The principal data sources were materials of the Committee for Sanitary and Epidemiological Control of the Ministry of Health of the Republic of Kazakhstan and regional health reports. The unit of analysis was the registered case of intestinal yersiniosis as reported in the source surveillance documents.

Descriptive statistics included annual case counts, incidence rates per 100,000 population, year-to-year changes, and age-specific indicators where these were available. Territorial analysis was used to describe the distribution of registered cases across regions and cities. Because the annual number of cases was small, the analysis was interpreted descriptively rather than as evidence of a stable long-term trend.

To place the national findings in context, a narrative literature search was conducted using PubMed, MEDLINE, Springer, and Google Scholar. Publications and surveillance reports addressing the epidemiology, laboratory diagnosis, burden, and international distribution of yersiniosis were reviewed. The literature component was used for contextual comparison and was not designed as a systematic review or meta-analysis.

Results

Context of acute intestinal infections

Analysis of the surveillance context showed that acute infectious diarrhea remains epidemiologically relevant in Kazakhstan; the persistence of this group of diseases over time is consistent with previously published observations [5].

Effective control of acute intestinal infections depends on identifying the predominant etiological agents in specific populations and geographic settings. These infections, caused by a broad range of pathogens, continue to generate substantial health-system and socioeconomic burden [6, 7].

The broader pediatric burden is also important: diarrhea remains a major cause of mortality among children younger than five years, particularly in resource-limited settings, where the determinants of severe and fatal disease remain incompletely characterized [8].

Temporal and age-specific dynamics in Kazakhstan

In 2020, four cases of enteritis caused by Yersinia enterocolitica were registered in Kazakhstan: three in Almaty and one in Shymkent. The national incidence rate was 0.02 per 100,000 population, compared with five cases and 0.03 per 100,000 in 2019 [9].

In 2021, eight cases were registered: five in Almaty, two in East Kazakhstan Region, and one in Zhambyl Region. The incidence rate increased to 0.04 per 100,000 population [10].

The largest annual count in the analyzed period was recorded in 2022, when 29 cases were reported, corresponding to an incidence rate of 0.14 per 100,000 population. Children younger than 14 years accounted for 23 cases, with an age-specific incidence rate of 0.40 per 100,000; one case was reported among adolescents aged 15–17 years [11].

In 2023, 11 cases were registered, with an incidence rate of 0.06 per 100,000 population. Ten of these cases occurred among children younger than 14 years, with an age-specific incidence rate of 0.18 per 100,000; no cases were registered among adolescents [12].

In 2024, 17 cases were registered, corresponding to 0.08 per 100,000 population. Three cases occurred among children younger than 14 years, with an incidence rate of 0.05 per 100,000, and three cases were reported among adolescents aged 15–17 years [13].

Table 1 - Registered intestinal yersiniosis in Kazakhstan, 2020 – 2024

Year	Cases	Incidence/100,000	Cases <14	Incidence <14	Cases 15–17
2020	4	0.02	NR	NR	NR
2021	8	0.04	NR	NR	NR
2022	29	0.14	23	0.40	1
2023	11	0.06	10	0.18	0
2024	17	0.08	3	0.05	3

NR — not reported in the source manuscript.

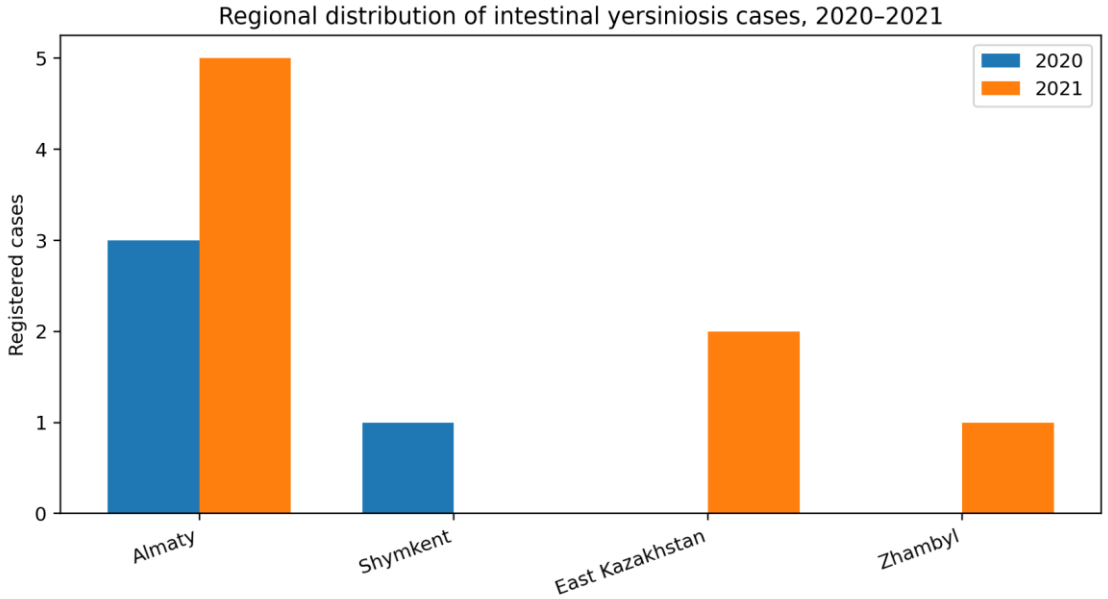


Figure 1 - Regional distribution of registered intestinal yersiniosis cases, 2020 - 2021.

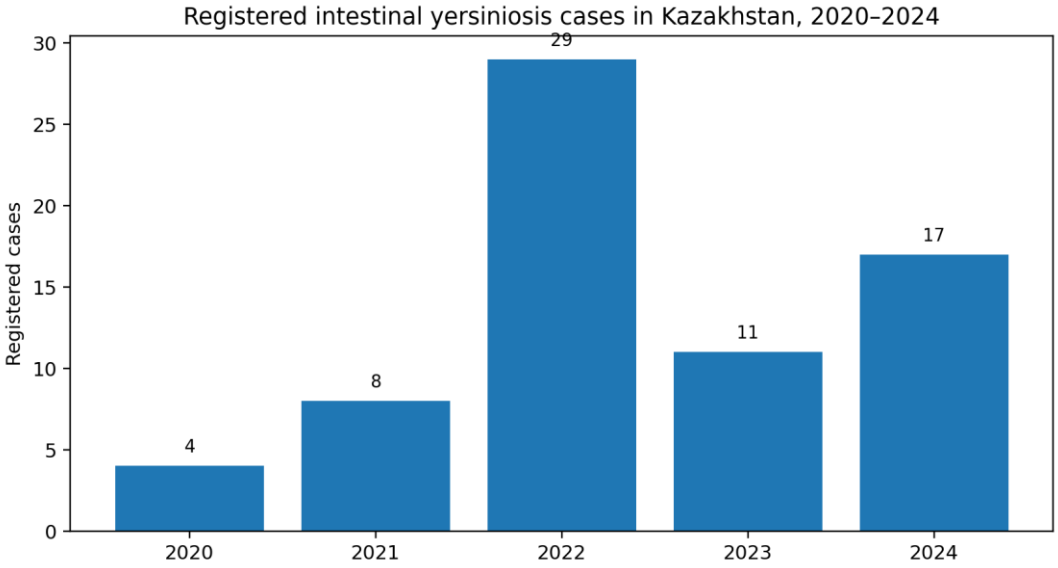


Figure 2 - Annual number of registered intestinal yersiniosis cases in Kazakhstan, 2020–2024.

Across the five-year period, the year-specific counts reported in the surveillance summaries total 69 cases. The series is characterized by a sharp peak in 2022, followed by a decline in 2023 and a partial increase in 2024. Because the absolute numbers are small, percentage changes between adjacent years should be interpreted cautiously. The available age-specific data show a pronounced predominance of children younger than 14 years in 2022 and 2023, but this pattern was less marked in 2024. Regional data were not presented with the same level of detail for every year. For 2020–2021, however, the largest number of cases was recorded in Almaty, with additional cases reported in Shymkent, East Kazakhstan Region, and Zhambyl Region. This supports the need for territorial surveillance but is insufficient on its own to establish a sustained geographic expansion across the entire 2020–2024 period.

Discussion

The national data show a low registered incidence of intestinal yersiniosis but substantial variation from year to year. The 2022 peak is the most prominent feature of the five-year series. When surveillance counts are small, relative increases and decreases can appear large even when the absolute difference is modest; therefore, the epidemiological interpretation should emphasize case counts, diagnostic practice, and reporting completeness alongside incidence rates.

The age distribution also requires a nuanced interpretation. Children younger than 14 years represented most registered cases in 2022 and 2023, supporting pediatric vigilance, but the 2024 distribution was less concentrated in this group. Thus, the available data support describing children as an important affected group rather than asserting a sustained increase in their proportion over the full observation period.

The comparison with other countries is useful mainly for understanding surveillance context rather than for direct ranking of disease burden, because diagnostic algorithms, laboratory capacity, reporting requirements, and foodborne-disease surveillance systems differ substantially.

International epidemiological context

International data indicate that the epidemiology of yersiniosis varies substantially between countries. In the Russian Federation, the etiological structure has shifted over time toward a greater proportion of intestinal yersiniosis: whereas pseudotuberculosis predominated in earlier periods, intestinal yersiniosis accounted for an increasing share of reported yersiniosis in the 2010s [14].

In the EU/EEA, the overall reported incidence in 2018 was 1.6 cases per 100,000 population, with the highest rates reported in Finland, the Czech Republic, Denmark, and Lithuania and the lowest in Romania and Bulgaria [15].

In 2020, 5,668 confirmed cases of yersiniosis were reported in 25 EU countries, with an overall incidence of 1.8 per 100,000 population. Hospitalization was reported for 29% of patients and mortality was low; Y. enterocolitica accounted for the great majority of human infections [16].

Germany and France were among the countries reporting high numbers of yersiniosis cases in 2020–2021 [17].

French surveillance data also described an increase in reported Y. enterocolitica isolates over the preceding decade, illustrating how diagnostic intensity and surveillance practice can influence observed trends [18,19].

In England, reported yersiniosis caused by Y. enterocolitica has fluctuated considerably over time, with renewed increases described from 2017 to 2020 and a possible contribution from the introduction of routine PCR testing [20].

The reported incidence in Ireland in 2020 was 0.26 per 100,000 population [21].

This figure was below the reported European average and broadly comparable with the United Kingdom [22].

Under-ascertainment remains a concern where routine screening is limited and culture, which has lower sensitivity than molecular methods, remains the principal diagnostic approach [23].

In the United States, Y. enterocolitica has been estimated to cause approximately 117,000 illnesses, 640 hospitalizations, and 35 deaths annually [24].

An annual incidence of approximately 1 case per 100,000 population has also been cited for the United States, with disease occurring particularly in young children [25].

New Zealand has reported substantially higher rates than many other industrialized countries; 1,202 cases were registered in 2018 and 1,186 in 2019, corresponding to 24.6 and 24.1 cases per 100,000 population, respectively [26].

Interpretation and implications for surveillance

The marked contrast between the low reported incidence in Kazakhstan and higher rates in several European countries and New Zealand should not be interpreted automatically as a true difference in transmission. Underdiagnosis, selective testing, limited use of molecular diagnostics, and variation in case ascertainment can all influence the number of registered infections. Strengthening laboratory capacity and integrating epidemiological and laboratory surveillance would therefore improve the interpretability of national trends.

From a prevention perspective, the findings support risk-oriented surveillance of foodborne and zoonotic transmission pathways, timely investigation of clusters, standardized regional reporting, and clinical awareness in pediatric practice. More complete territorial and age-specific data would allow future analyses to distinguish localized outbreaks from broader changes in endemic transmission.

Strengths and limitations

A strength of this study is the consolidation of five consecutive years of official national surveillance indicators with age-specific and territorial information where available. The principal limitations are the small number of registered cases, incomplete regional detail for some years, the absence of individual-level clinical or exposure data, and limited information on case-definition changes or diagnostic testing intensity. The contextual literature search was narrative; a reproducible systematic-search strategy, formal study selection flow, and risk-of-bias assessment were not available. These limitations restrict causal interpretation and cross-country comparability.

Conclusion

During 2020–2024, registered intestinal yersiniosis in Kazakhstan remained uncommon but showed pronounced year-to-year variability, with the highest annual count in 2022. Almaty accounted for the largest share of cases in the available 2020–2021 territorial data, and children younger than 14 years represented a particularly important affected group in 2022 and 2023.

The findings support continuous sanitary and epidemiological surveillance, improved laboratory diagnostics, harmonized regional reporting, and targeted preventive measures. Future national analyses would benefit from consistent age- and region-specific denominators, standardized diagnostic criteria, and linkage of epidemiological surveillance with laboratory data to determine whether

observed fluctuations reflect changes in transmission, testing, or reporting.

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Declarations

Ethics statement. The study used aggregated epidemiological statistics and published sources and did not involve collection or processing of individual patient-level data.

Conflict of interest. The authors declare no conflicts of interest requiring disclosure.

Author Contributions. U. Almukhanbetkyzy - Conceptualization; Investigation; Data Curation; Writing - Original Draft. M.A. Baimuratova - Conceptualization; Supervision. D.B. Abdukalikova - Conceptualization; Supervision. A.K. Raushan - Writing – Review & Editing. Zh.S. Kalel - Writing - Review & Editing. All authors read and approved the final version of the manuscript.

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Декларации

Этическое заявление. В исследовании использованы агрегированные эпидемиологические статистические данные и опубликованные источники; сбор и обработка индивидуальных данных пациентов не проводились.

Конфликт интересов. Авторы заявляют об отсутствии конфликтов интересов, требующих раскрытия.

Вклад авторов. Ұ. Әлмуханбетқызы - концептуализация; проведение исследования; курирование данных; написание первоначального варианта рукописи. М.А. Баймуратова - концептуализация; научное руководство. Д.Б. Абдукаликова - концептуализация; научное руководство. А.Қ. Раушан - рецензирование и редактирование рукописи. Ж.С. Калел - рецензирование и редактирование рукописи. Все авторы прочитали и одобрили окончательную версию рукописи.

Финансирование. Финансирование отсутствовало.

Доступность данных. Исследование основано на агрегированных официальных материалах эпидемиологического надзора и опубликованных источниках, представленных в списке литературы.

Мәлімдемелер

Этикалық мәлімдеме. Зерттеуде агрегатталған эпидемиологиялық статистикалық деректер мен жарияланған дереккөздер пайдаланылды; пациенттердің жеке деңгейдегі деректерін жинау немесе өңдеу жүргізілген жоқ.

Мүдделер қақтығысы. Авторлар ашуды талап ететін мүдделер қақтығысының жоқ екенін мәлімдейді.

Авторлардың үлесі. Ұ. Әлмуханбетқызы - тұжырымдаманы әзірлеу; зерттеу жүргізу; деректерді басқару; қолжазбаның бастапқы нұсқасын дайындау. М.А. Баймуратова - тұжырымдаманы әзірлеу; ғылыми жетекшілік. Д.Б. Абдукаликова - тұжырымдаманы әзірлеу; ғылыми жетекшілік. А.Қ. Раушан - қолжазбаны рецензиялау және редакциялау. Ж.С. Калел - қолжазбаны рецензиялау және редакциялау. Барлық авторлар қолжазбаның соңғы нұсқасын оқып, мақұлдады.

Қаржыландыру. Қаржыландыру болған жоқ.

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