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BIG DATA ANALYTICS IN PUBLIC HEALTH SURVEILLANCE AND EPIDEMIOLOGICAL MONITORING

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Relevance

Public health surveillance has traditionally relied on structured, periodic reporting of defined notifiable conditions through dedicated epidemiological channels. The accumulation of large-scale digital data streams, including electronic health records, pharmacy dispensing records, laboratory information systems, internet search query logs, social media activity, and, increasingly, mobility data derived from mobile network operators, has created the possibility of near-real-time, high-resolution public health surveillance that substantially shortens the interval between the emergence of a public health signal and its detection by health authorities, a capability whose importance was demonstrated prominently during the COVID-19 pandemic.

Keywords: big data, public health surveillance, syndromic surveillance, genomic surveillance, epidemiology, predictive modelling.

Introduction

Methodologically, big data analytics in public health draws on three complementary techniques [1]. Syndromic surveillance aggregates non-diagnostic signals, such as pharmacy sales of symptom-relieving medication or the frequency of relevant search engine queries, to detect anomalous increases in symptom prevalence before formal diagnostic confirmation becomes available.



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Genomic surveillance, enabled by the falling cost of next-generation sequencing, allows near-real-time tracking of pathogen variants and transmission chains, which proved decisive for tracking the emergence and spread of SARS-CoV-2 variants internationally. Predictive modelling applies statistical and machine-learning techniques to historical and real-time surveillance data to forecast the likely short-term trajectory of an outbreak, supporting resource allocation decisions such as hospital bed capacity planning and vaccine distribution.

The application of big data methods to public health surveillance raises specific methodological and ethical challenges that must be addressed for the resulting intelligence to be both valid and acceptable. Data quality and representativeness are significant concerns, since digital data sources such as internet search activity or smartphone-derived mobility data systematically under-represent population groups with lower digital access, including, in many Central Asian contexts, older adults and rural populations, which can bias surveillance estimates if not explicitly corrected for. Privacy protection is a second major concern, since many of the most informative big data sources, particularly mobility and social media data, carry substantial potential for re-identification of individuals even after nominal anonymisation, requiring rigorous data governance frameworks, aggregation thresholds, and, where appropriate, differential privacy techniques [3]. Finally, the interpretability and validation of predictive models against ground-truth epidemiological outcomes remains essential, since models that perform well retrospectively do not automatically generalise reliably to novel outbreak dynamics [2].

Conclusion

Big data analytics substantially extends the speed, resolution, and scope of public health surveillance beyond what is achievable through traditional notifiable-disease reporting alone, and has already demonstrated practical value in outbreak



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detection and genomic tracking of pathogens. Its continued development as a public health tool, including in Central Asia, depends on addressing representativeness and privacy concerns transparently and on rigorously validating predictive outputs against subsequent epidemiological reality rather than treating model output as surveillance ground truth in itself.

References

1. Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: promise and potential. *Health Information Science and Systems*, 2, 3. <https://doi.org/10.1186/2047-2501-2-3>
2. Lazer, D., Kennedy, R., King, G., & Vespignani, A. (2014). The parable of Google Flu: traps in big data analysis. *Science*, 343(6176), 1203–1205. <https://doi.org/10.1126/science.1248506>
3. World Health Organization. (2021). *Global strategy on digital health 2020–2025*. Geneva: World Health Organization.
4. Мухамедова, Н. Х., & Собирова, М. Р. (2023). ОЦЕНКА МАРКЕРОВ ПОВРЕЖДЕНИЯ КЛУБОЧКОВ ПРИ МЕТАБОЛИЧЕСКОМ СИНДРОМЕ У ЖЕНЩИН В ПОСТМЕНОПАУЗАЛЬНОМ ПЕРИОДЕ.
5. Нурметов, Х. Т., Маруфханов, Х. М., Талипов, Р. М., & Тухтаева, Н. Х. (2023). Клиникоэпидемиологические особенности анкилозирующего спондилартрита в условиях стационара.
6. Нурметов, Х. Т., Маруфханов, Х. М., Талипов, Р. М., & Тухтаева, Н. Х. (2023). Clinical and Epidemiological Features of Ankylosing Spondylarthritis in A Hospital Setting.
7. Kh, T. N., Sh, K. M., & Kurbanov, A. K. (2021). Assessment of the gastrointestinal tract in patients with rheumatoid arthritis. *European Journal of Pharmaceutical and Medical Research*, 2(5), 34-37.



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8. Мухамедова, Н. Х., & Бауетдинова, Г. Д. (2023). ПОЧЕЧНЫЕ И ВНЕПОЧЕЧНЫЕ ЗАБОЛЕВАНИЯ. ИХ ЭТИОЛОГИЧЕСКИЕ И ЭПИДЕМИОЛОГИЧЕСКИЕ ПРОЯВЛЕНИЯ.
9. Мухамедова, Н. Х., & Собирова, М. Р. (2023). ОЦЕНКА МАРКЕРОВ ПОВРЕЖДЕНИЯ КЛУБОЧКОВ ПРИ МЕТАБОЛИЧЕСКОМ СИНДРОМЕ У ЖЕНЩИН В ПОСТМЕНОПАУЗАЛЬНОМ ПЕРИОДЕ.
10. Собирова, М., & Мухамедова, Н. Х. (2024). АНТРОПОМЕТРИЧЕСКИЕ ПОКАЗАТЕЛИ ПРИ МЕТАБОЛИЧЕСКИХ НАРУШЕНИЯХ У ЖЕНЩИН ПОСТМЕНОПАУЗАЛЬНОМ ПЕРИОДЕ. *Innovations in Science and Technologies*, 1(1), 134-137.
11. Мухамедова, Н. Х. (2024). СУРУНКАЛИ БУЙРАК КАСАЛЛИГИ БИЛАН ОФРИГАН НЕФРОСКЛЕРОЗ МАВЖУД БЕМОРЛАРДА ТОМИР ЭНДОТЕЛИЙСИ ҲОЛАТИНИ БАҲОЛАШ.
12. Бауетдинова, Г. Д., & Мухамедова, Н. Х. (2024). СУРУНКАЛИ БУЙРАК КАСАЛЛИКЛАРИ РИВОЖЛАНИШИДА ЭНДОТЕЛИАЛ ДИСФУНКЦИЯ АҲАМИЯТИ. *Innovations in Science and Technologies*, 1(1), 119-127.
13. Мирзаев, Х., Ризаев, Э., Мухамедова, Н., & Усманова, Ш. (2024). ОЦЕНКА МЕТАБОЛИЗМА КОСТНОЙ ТКАНИ ЗУБОЧЕЛЮСТНОЙ СИСТЕМЫ У БОЛЬНЫХ ЗАБОЛЕВАНИЕМ ТУБУЛОИНТЕРСТИЦИАЛЬНОЙ СИСТЕМЫ ПОЧЕК. *Innovations in Science and Technologies*, 1(2), 35-42.
14. Усманова, Ш., Мухамедова, Н., Давлатова, Д., Умерова, Ф., & Тошмурадова, М. (2024). ВЛИЯНИЕ ПАТОЛОГИИ ПОЧЕК НА СТОМАТОЛОГИЧЕСКУЮ ЗАБОЛЕВАЕМОСТЬ. *Innovations in Science and Technologies*, 1(2), 21-28.



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15. Halimovna, M. N., Pulatovna, S. U., & Rikhsievna, S. M. (2021). ESPECIALLY CHANGES GOMOCYSTEINE IN WOMEN OF CHILDBEARING AGE WITH METABOLIC SYNDROME. European science, (1 (57)), 57-60.
16. Kh, M. N., & Shukurova, U. P. (2021). Modern Methods for Diagnosing Disorders of Kidney Function (Literature Review). Central Asian Journal of Medical and Natural Science, 2(4), 176-181.
17. Набиева, Д. А., & Мухамедова, Н. Х. (2017). Параллелизм множественных повреждений при неалкогольной жировой болезни печени у больных подагрой и псевдоподагрой. Узбекистан тиббиет журнали, (6), 83-87.
18. Мухамедова, Н. Х. (2015). К механизму дисфункции эндотелия при метаболическом синдроме у женщин репродуктивного и постменопаузального периода. Молодой ученый, 11(91), 683-7.
19. Фазилова, Л. А. Электронное обучение как возможность для повышения качества образования. Pedagogika” научно-теоретический и методический журнал, 321-323.
20. Фазилова, Л. (2025). ТАЛАБАЛАРНИНГ АКТГА ОИД КОМПЕТЕНТЛИГИНИ РИВОЖЛАНТИРИШ. Academic research in educational sciences, (Conference 1), 96-101.
21. Фазилова, Л. А. (2018). Стоматологияни урганишда мобил иловаларни урни. Stomatologiya Научно-практический журнал, (2), 71.
22. Фазилова, Л. А. (2018). The role of mobile applications in learning dentistry.
23. Каюмова, М. (2025). Цифровые технологии в клинической практике: перспективы и вызовы. Academic research in educational sciences, (Conference 1), 165-168.



Global Conference on Medical and Health Sciences

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Website: <https://econferencia.com>

24. Фазилова, Л. А. (2025). Масофавий таълимни ташкил этишда онлайн маърузалардан фойдаланишнинг назарий-методологик аҳдмияти. "Замонавий тиббий олий таълим: муаммолар, хорижий тажриба, истикболлар" мавзусидаги VII уқувслужбий анжуман туплами.-УДК, 004-37.
25. Nurmatova, F. B., Xuan, R., & Fazilova, L. A. (2024). The advantages of implementing digital technology in education. *Innovations in Science and Technologies*, 1(3), 192-195.
26. Abduganieva, S., Fazilova, L., Nurmatova, F., & Khodjaeva, D. (2023). Computer-human interaction: Web technologies in education. *PROBLEMS IN THE TEXTILE AND LIGHT INDUSTRY IN THE CONTEXT OF INTEGRATION OF SCIENCE AND INDUSTRY AND WAYS TO SOLVE THEM:(PTLICISIWS-2022)*, 2789(1), 050005.
27. Фазилова, Л. А., & Абдуганиева, Ш. Х. (2018). Компьютерные технологии в высшем медицинском образовании. *Stomatologiya*, (4), 59-61.
28. Никонорова, М. Л., Нурматова, Ф. Б., Абдуганиевна, Ш. Х., & Фазилова, Л. А. (2022). Методический кейс как инновационная образовательная технология. *Scientific approach to the modern education system*, 1(10), 115-119.
29. Иргашева, С. У., Гулламахмудова, Д. В., Алиева, М. М., & РУз, Р. М. СРАВНИТЕЛЬНАЯ ОЦЕНКА КЛИНИЧЕСКИХ ПОКАЗАТЕЛЕЙ РАЗЛИЧНЫХ ФОРМ ПОЛИКИСТОЗА ЯИЧНИКОВ. МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ УЗБЕКИСТАН РЕСПУБЛИКАНСКИЙ СПЕЦИАЛИЗИРОВАННЫЙ НАУЧНО-ПРАКТИЧЕСКИЙ МЕДИЦИНСКИЙ ЦЕНТР АКУШЕРСТВА И ГИНЕКОЛОГИИ АССОЦИАЦИЯ ВРАЧЕЙ



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SHIFO» & V «МАНЛИЙО-SHIFO» & V, 59.

- 30.Эргашева, Н. Н., & Юнусов, М. З. У. (2022). Синдром дефицита внимания и гиперактивности или СДВГ. Медицинский взгляд на проблему. Oriental renaissance: Innovative, educational, natural and social sciences, 2(2), 818-825.