

The Necessity of a Comprehensive Study on the Impact of Time Shift on Population Health in the Republic of Kazakhstan

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1. BACKGROUND

The transition of the Republic of Kazakhstan to a unified time zone has become a significant public event, sparking active discussions and numerous complaints from citizens. Many report deteriorations in well-being, reduced work performance, disruptions to sleep patterns, and difficulties adapting to new daily schedules. Despite substantial public concern, scientifically validated data on how time changes affect the population's mental and physical health remain lacking. Given the existing challenges confronting the national healthcare system, a systematic, methodologically rigorous study is needed.

2. OBJECTIVE

The aim of such research should not only be to assess the extent and nature of potential adverse health consequences, but also to develop scientifically grounded recommendations for government bodies to minimize risks to public health.

3. RESULTS AND DISCUSSION

Changes in time regimes can substantially influence human circadian rhythms—the internal biological “clock” that regulates sleep-wake cycles, metabolism, and the functions of the cardiovascular, endocrine, and immune systems (1-3). International data suggest that disruptions in circadian regulation may be associated with increased incidences of cardiovascular diseases, metabolic disorders, elevated stress and anxiety levels (4-6). Furthermore, alterations in daily schedules may also affect the fields of labor and education, impacting work productivity, academic performance, and broader social well-being (7).

Several international studies have pointed to a rise in consultations with medical professionals for insomnia, chronic fatigue, and depressive symptoms following changes in time settings (8, 9). Such effects are especially pronounced among individuals with pre-existing chronic conditions and older populations (10-12). In Kazakhstan, given the climatic and socio-demographic

diversity of its regions, vulnerability to these factors may vary widely, necessitating localized research that accounts for the country's unique characteristics.

Sleep disturbances and chronic fatigue can evolve into systemic issues affecting industrial output, workplace discipline, and economic efficiency (13-15). At a time of increasing competition in international markets and concerns over labor migration, preserving and strengthening population health is crucial for sustainable development. Standardizing time zones without considering biological and social adaptation may lead to more sick leaves, lower labor productivity, and higher financial burdens on the healthcare system.

In the educational sector, circadian rhythm disruptions could impair concentration, motivation to learn, and thereby academic performance (4, 16). Establishing causal links between time changes and educational outcomes can inform evidence-based decisions aimed at optimizing the learning process and safeguarding students' health.

Equally important are socio-demographic differences: various age groups, genders, and professions may respond differently to time shifts. Studying these differences is key to developing targeted preventive measures and recommendations.

Proposed Research Methodology

A comprehensive, interdisciplinary approach is necessary to objectively assess the impact of time changes on public health. The proposed study will focus on the following areas:

Psychological Health: Measuring stress, anxiety, and depression levels using validated scales (e.g., the Hospital Anxiety and Depression Scale, HADS; the Perceived Stress Scale, PSS). Assessing sleep quality with the Pittsburgh Sleep Quality Index (PSQI), sleep diaries, and wearable devices for objective sleep parameter tracking. Evaluating subjective well-being (WHO-5 Well-Being Index, Satisfaction with Life Scale) before the introduction of a unified time regime, as well as six months and one year after its implementation, taking into account seasonal fluctuations and regional differences.

Physiological Health: Determining biomarkers of circadian rhythms (cortisol and melatonin levels) in blood or saliva for an objective evaluation of how time shifts affect hormonal balance. Measuring metabolic indicators (glucose, cholesterol, triglycerides) before and after the implementation of the unified time, with follow-up measurements at 6 and 12 months to identify long-term changes. Analyzing rates of medical consultations for sleep disorders, cardiovascular and endocrine diseases, as well as psychosomatic disorders associated with altered daily rhythms.

Socio-Demographic Indicators: Examining trends in labor productivity, absenteeism, sick leave usage, and other workforce-related indicators. Evaluating academic performance and attendance in educational institutions, along with subjective assessments by students and faculty regarding changes in educational quality. Collecting statistical data on various socio-demographic groups to identify the most vulnerable categories of the population.

Epidemiological Data: Analyzing medical consultations related to insomnia, chronic fatigue, and depressive conditions before and after the time shift. Investigating the dynamics of morbidity and mortality in different regions, considering their socio-economic and climatic profiles, to identify possible epidemiological patterns.

Legal and Ethical Aspects: Comparing national regulations on time standards with WHO recommendations and international practices. Conducting legal assessments of the impact on labor and education, evaluating the protection of workers' and students' rights, and considering potential adjustments to the regulatory framework to balance public health interests with economic feasibility.

4. CONCLUSION

The introduction of a unified time regime in the Republic of Kazakhstan requires careful scientific evaluation and analysis of potential implications for population health. The proposed study, encompassing psychological, physiological, socio-demographic, epidemiological, legal, and ethical dimensions, will provide a comprehensive understanding of the effects of such time shifts on society. Based on the findings, evidence-based recommendations and management strategies will be developed to mitigate negative outcomes and support public health over the long term. This integrated and systematic approach represents a significant step towards enhancing the effectiveness of national health policy and ensuring social stability in Kazakhstan.

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REFERENCES

1. Fuller PM, Gooley JJ, Saper CB. Neurobiology of the sleep-wake cycle: sleep architecture, circadian regulation, and regulatory feedback. *J Biol Rhythms*. 2006; 21(6): 482-493. doi: 10.1177/0748730406294627.
2. Meira E Cruz M, Miyazawa M, Manfredini R, Cardinali D, Madrid JA, Reiter R, et al. Impact of Daylight Saving Time on circadian timing system: An expert statement. *Eur J Intern Med*. 2019; 60: 1-3. doi: 10.1016/j.ejim.2019.01.001.
3. Shi D, Chen J, Wang J, Yao J, Huang Y, Zhang G, et al. Circadian Clock Genes in the Metabolism of Non-alcoholic Fatty Liver Disease. *Front Physiol*. 2019; 10: 423. doi: 10.3389/fphys.2019.00423.
4. Facer-Childs ER, Boiling S, Balanos GM. The effects of time of day and chronotype on cognitive and physical performance in healthy volunteers. *SportMed - Open*. 2018; 4(1): 47. doi:10.1186/s40798-018-0162-z
5. Zimmet P, Alberti KGMM, Stern N, Bilu C, El-Osta A, Einat H, et al. The Circadian Syndrome: is the Metabolic Syndrome and much more! *J Intern Med*. 2019; 286(2): 181-191. doi: 10.1111/joim.12924.
6. Walker WH 2nd, Walton JC, Nelson RJ. Disrupted circadian rhythms and mental health. *Handb Clin Neurol*. 2021; 179: 259-270. doi: 10.1016/B978-0-12-819975-6.00016-9.
7. Hasler BP, Soehner AM, Clark DB. Circadian rhythms and risk for substance use disorders in adolescence. *Curr Opin Psychiatry*. 2014; 27(6): 460-6. doi: 10.1097/YCO.000000000000107.
8. Rishi MA, Ahmed O, Barrantes Perez JH, Berneking M, Dombrowsky J, Flynn-Evans EE, et al. Daylight saving time: an American Academy of Sleep Medicine position statement. *J Clin Sleep Med*. 2020; 16(10): 1781-1784. doi: 10.5664/jcsm.8780.9
9. Caldwell JA, Caldwell JL, Thompson LA, Lieberman HR. Fatigue and its management in the workplace. *Neurosci Biobehav Rev*. 2019; 96: 272-289. doi: 10.1016/j.neubiorev.2018.10.024.
10. Otamas A, Grant PJ, Ajjan RA. Diabetes and atherothrombosis: The circadian rhythm and role of melatonin in vascular protection. *Diab Vasc Dis Res*. 2020; 17(3): 1479164120920582. doi: 10.1177/1479164120920582.
11. Ferrell JM, Chiang JY. Circadian rhythms in liver metabolism and disease. *Acta Pharm Sin B*. 2015; 5(2): 113-122. doi: 10.1016/j.apsb.2015.01.003.
12. Hou Y, Liu L, Chen X, Li Q, Li J. Association between circadian disruption and diseases: A narrative review. *Life Sci*. 2020; 262: 118512. doi: 10.1016/j.lfs.2020.118512.
13. Iranzo A. An Overview on Sleep Medicine. *Adv Exp Med Biol*. 2022; 1384: 3-15. doi: 10.1007/978-3-031-06413-5_1.
14. Steffey MA, Scharf VF, Risselada M, Buote NJ, Griffon D, Winter AL, et al. A narrative review of the pathophysiology and impacts of insufficient and disrupted sleep. *Can Vet J*. 2023; 64(6): 579-587.
15. Walker WH 2nd, Walton JC, DeVries AC, Nelson RJ. Circadian rhythm disruption and mental health. *Transl Psychiatry*. 2020; 10(1): 28. doi: 10.1038/s41398-020-0694-0.
16. Goel N, Basner M, Rao H, Dinges DF. Circadian rhythms, sleep deprivation, and human performance. *Prog Mol Biol Transl Sci*. 2013; 119: 155-190. doi: 10.1016/B978-0-12-396971-2.