

**The written report from the official reviewer, Candidate of Medical Sciences,
Associate Professor Keneshbek Dzhusupov on the thesis of
BOLATOVA ZHANERKE ERLANOVNA
on the topic "Assessing access to water, sanitation and hygiene in schools", submitted for the degree of Doctor of
Philosophy (PhD) in the educational program 6D110200 - "Public Health"**

№	Criteria	Compliance with criteria (one of the answer options should be marked)	Justification of the official reviewer's position
1.	The topic of the thesis (at the date of its approval) corresponds to the directions of science development and/or state programs	<p>1.1 Compliance with priority directions of science development or state programs:</p> <p>1) The dissertation was carried out within the framework of a project or target program financed from the state budget (specify the name and number of the project or program)</p> <p>2) The dissertation was carried out within the framework of another state program (specify the name of the program)</p> <p>3) The dissertation corresponds to the priority direction of science development approved by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan (specify the direction)</p>	<p>Analysis of access to water, sanitation and hygiene in educational institutions, in this case schools, plays a crucial role in ensuring the health and well-being of children and, consequently, the nation's future. This line of research impacts students' physical and psychological development and thus is directly related to life science.</p> <p>The dissertation devoted to the assessment of access to water, sanitation and hygiene in schools deserves attention and positive evaluation, as it is closely related to the priority direction of science development approved by the High Scientific and Technical Commission under the Government of the Republic of Kazakhstan in the field of "Life Science".</p>
2.	Importance for science	The work does/does not make a significant contribution to science, and	The thesis makes a significant scientific contribution by offering preliminary data and estimations of school access to water, sanitation,

		its importance is well-disclosed /not uncovered	and hygiene services. The work broadens the scope of knowledge on the topic and offers a fresh viewpoint. The evaluation of service quality and the identification of variables influencing schoolchildren's hygiene practices enhance the field of research and advance knowledge of the dynamics of sanitation and hygiene in educational settings.
3..	The principle of independence	Level of autonomy: 1) High; 2) Medium; 3) Low; 4) No independence	The author adeptly navigates through a diverse array of tasks in the dissertation, showcasing a need for a comprehensive perspective and in-depth understanding of multiple facets of the problem at hand. This broad outlook enriches the overall quality of the work, indicating a thorough engagement with the complexities of the subject matter.
4.	The principle of internal unity	4.1 Justification of the relevance of the thesis: 1) Justified; 2) Partially justified; 3) Not substantiated.	The relevance of the thesis is justified because the lack of information on the status of water and sanitation in schools becomes an obstacle to the protection of children's rights to education. Ensuring access to water and sanitation services in educational institutions is recognized as an inalienable right of every child, derived from the sustainable development goals. This thesis aims to fill this information gap to protect children's health and education in line with global goals.
		4.2 The content of the thesis reflects the thesis topic: 1) Reflects; 2) Partially reflects; 3) Does not reflect	The content of the thesis is entirely in line with its subject matter. The aim and objectives of the study clearly express the essence of the dissertation topic by assessing the current status of water, sanitation and hygiene (WASH) services in schools.
		4.3 The aim and objectives are consistent with the thesis topic: 1) correspond; 2) partially correspond; 3) do not correspond	The aim and objectives of the thesis closely correspond to its topic. The study's objectives explicitly express the study's aim: to assess the current status of access to water, sanitation and hygiene in schools. The study's objectives complement this aim by providing a detailed investigation of the various aspects of the topic. The formulation of the research aim and objectives clearly and

			accurately reflects the topic's essence, providing the basis for an in-depth and comprehensive analysis of access to water, sanitation and hygiene in schools and developing practical recommendations for improving sanitation and epidemiological conditions.
		<p>4.4 All sections and statements of the thesis are logically interrelated:</p> <ol style="list-style-type: none"> 1) fully interrelated; 2) partially interrelated; 3) no interrelation 	<p>All sections and provisions of the thesis are closely interrelated and logically follow the set goal and objectives of the research.</p> <p>Each section of the dissertation is logically interrelated with the general topic and aims to provide a unified and consistent study of water access, sanitation and hygiene in schools.</p>
		<p>4.5 New solutions (principles, methods) proposed by the author are well-reasoned and evaluated in comparison with known solutions:</p> <ol style="list-style-type: none"> 1) it has critical analysis; 2) the analysis is partial; 3) the analysis is not the author's own opinions but quotes from other authors 	<p>The thesis text is an extensive study where the author has critically analyzed the solutions using a cross-sectional study and various data collection methods. Using a cross-sectional study with different data collection methods provides a comprehensive picture of school access to WASH. Analyzing the data using SPSS and multiple logistic regression presents a new method of examining the impact of factors on WASH access. Recommendations complement the methods, making the thesis a meaningful contribution to school-based health and epidemiological research.</p>
5.	The principle of scientific novelty	<p>5.1 Are the scientific results and provisions new?</p> <ol style="list-style-type: none"> 1) entirely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new) 	<p>The scientific results and provisions presented in the thesis are groundbreaking, constituting entirely new research findings derived from a comprehensive analysis of the water, sanitation, and hygiene (WASH) scenario in schools in Kazakhstan. The author's work significantly advances the scientific understanding of WASH conditions in Kazakhstani schools, providing novel insights that serve as a foundational framework for formulating effective strategies to enhance sanitation and hygiene standards in educational institutions. The innovative nature of these results underscores the thesis's valuable contribution to the field, marking a noteworthy advancement in knowledge of WASH issues within the specific context of Kazakhstani</p>

			schools.
		<p>5.2 Are the findings of the thesis new?</p> <p>1) entirely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)</p>	<p>The scientific findings and provisions of this thesis represent an original contribution to the field of school sanitary-hygienic research, providing new data and perspectives. Recommendations include a comprehensive needs assessment and innovations, such as introducing a practical tool for educational institutions.</p>
		<p>5.3 Technical, technological, economic or management decisions are new and justified:</p> <p>1) entirely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)</p>	<p>The practical recommendations proposed in the thesis represent innovative and valid approaches to improving school sanitation and hygiene. Such technical, technological, economic and managerial solutions represent an innovative contribution to school sanitation and hygiene and are reasonably aimed at improving. They are the quality of education and the health of students.</p>
6.	The validity of the main findings	All significant findings are /are not based on scientifically rigorous evidence or are reasonably well supported (for qualitative research and arts and humanities training areas).	<p>Significant conclusions in the thesis are scientifically sound and based on solid evidence. The author conducted the study using modern scientific research methods, an extensive literature review and statistical data analysis. These methods ensure the reliability and scientific validity of the findings. Additionally, the author refers to relevant scientific literature, confirming the study's quality. Thus, it can be stated that all the main conclusions in the thesis are supported by strong scientific evidence.</p>
7.	The main points to be defended	<p>The following questions need to be answered for each provision individually:</p> <p>7.1 Is the position proven? 1) proven;</p>	<p>Regarding the first provision, the thesis provides scientific evidence to support the claim that there are variations in Kazakhstan's school water, sanitation, and hygiene conditions and that not all schools, particularly those in remote areas, have equitable access to WASH services. The provision is significant because it represents</p>

- 2) rather proven;
- 3) rather not proven;
- 4) not proven
- 7.2 Is it trivial?
- 1) yes;
- 2) no**
- 7.3 Is it new?
- 1) yes;**
- 2) no
- 7.4 The level for application is:
- 1) narrow;
- 2) medium;
- 3) wide**
- 7.5 Is it proven in the article?
- 1) yes;**
- 2) no

fundamental variations in students' access to sanitation facilities in different schools, which may harm their health. The provision is unique based on the study and literature evaluation done for the thesis. The provision may be necessary for developing health and education policies and practises, and it has a wide range of applications concerning school health and hygiene conditions. The thesis provides scientific justification for the provision, demonstrating its applicability and validity in science.

The second provision states that the epidemiological situation on infectious morbidity connected to water supply, sanitation, and hygiene shows a declining tendency, as scientifically supported by the thesis and verified by retrospective analysis of data from the annual statistical collection. This novel and crucial provision is established in science and holds great significance for public health because it is not trivial and has a wide range of applications.

Regarding the third provision, the thesis reveals inadequate hygienic facilities in urban schools while offering a scientifically supported opinion on centralized water supplies and sanitation systems in most of these educational establishments. The study used various techniques, including observation, a survey of parents and teachers, and a questionnaire for students, all of which contribute to the scientific validity of this position. This new provision is significant and vital to health and education since it is not trivial and has broad applicability.

The thesis's fourth defenseable statement has a scientific foundation. Based on the study, children's hygiene behaviour is influenced by several variables, including the school's location, the children's age, the availability of water, the quality of services in the neighbourhood, and sanitation and hygiene education. The author employed multiple binary logistic regression to support this claim. This new provision is significant since it is based on a thorough scientific

			analysis of several variables that affect students' hygiene practices. The provision can aid in developing health and education programmes and policies and has a wide range of applications. The thesis's scientific validation and documentation further support its scientific significance.
8.	Principle of reliability Reliability of provided sources and information	8.1 Choice of methodology - justified or methodology is sufficiently detailed 1) yes; 2) no	Based on rigorous scientific validity, the methodology includes data collection methods such as questionnaires to administrative staff parents and observation. An online student questionnaire complements the analysis by providing data on satisfaction with WASH services. The use of IBM SPSS Statistics and multiple logistic regression analysis emphasizes the scientific and severe nature of the study, considering the associated factors for a thorough understanding of the results.
		8.2 The results of the thesis were obtained using modern methods of scientific research and techniques of data processing and interpretation with the use of computer technologies: 1) yes; 2) no	The results of the dissertation work were obtained using modern methods of scientific research and data processing techniques using computer technologies. The study included questionnaires and epidemiological, analytical and statistical analyses. The cross-sectional study assessed access to WASH services in schools using various data collection methods, including questionnaires and observational methods. Analyses were conducted using the IBM SPSS Statistics package and multiple logistic regression.
		8.3 Theoretical conclusions, models, revealed interrelations and regularities are proved and confirmed by experimental research (for the directions of training in pedagogical sciences, the results are proved based on pedagogical experiment): 1) yes; 2) no	The theoretical findings, models and identified relationships presented in the thesis were experimentally validated. The statistical analysis results confirm the influence of various factors on students' hygiene behavior, such as school location, gender, educational outreach and quality of WASH services.

		8.4 Important statements are confirmed /partially confirmed/not confirmed by references of relevant and reliable scientific literature	References to relevant and reliable scientific literature support essential assertions in the thesis. The author has extensively used and analyzed existing research and theoretical works, strengthening the study's theoretical basis and scientific validity. References to reputable researchers and academic sources support the importance and relevance of the assertions presented in the thesis.
		8.5 Used literature sources are sufficient /not sufficient for a literature review	The literature sources utilized provide an adequate foundation for the literature review. The citation of relevant literature strengthens the thesis with a scientific foundation, supporting the assertions and conclusions presented.
9	The principle of practical value	9.1 The thesis has theoretical significance: 1) yes; 2) no	The thesis has theoretical significance as its findings can guide student training and curriculum development whose goals are improving school water, sanitation and hygiene skills. The study examines access to WASH in a public health context, providing a framework for developing strategies to improve school health. Recommendations can contribute to a safe learning environment, positively impacting learning and students' overall well-being.
		9.2 The dissertation has practical significance, and there is a high probability that the findings will be applied in practice: 1) yes; 2) no	The dissertation has high practical significance, as educational authorities, school administrators, and teachers can directly apply recommendations. Recommendations on educational courses and monitoring form correct hygienic habits of students and are controlled at the school administration level. The study results have already been implemented in educational organizations such as the specialized boarding school-lyceum "Daryn", Akbaev General Education School and Zhambyl specialized boarding school-lyceum.
		9.3 Are the practice proposals new? 1) entirely new; 2) partially new (25-75% are new);	This thesis presents fresh recommendations for practice. The study carried out by the author uncovered novel facets of the availability of water, sanitation, and hygiene facilities in schools, along with the

