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Quality of Life publishes original research papers and reviews and aims to provide a forum for the rapid dissemination of significant novel research in the various disciplines encompassing the Science and technology of food, Public health engineering, Sanitary inspection and control, Environmental and public health. Topics covered by the journal include:

- Dietetics; Nutrition principles applied to foods
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- Industrial microbiology; Science and technique of applied microbiology; Applied mycology
- Public Health, environment and hygiene
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## DEAR READERS,

It is a distinct honour to welcome you to this latest issue of *Quality of Life*. As we navigate the complexities and innovations of 2026, we look back with pride on the journey that has brought us here, while firmly focusing on the future of global well-being.

Our mission remains steadfast: to serve as a premier platform for high-quality research across the vital disciplines of **Food Science and Technology, Public Health Engineering, Sanitary Control, and Environmental Health**. In an era where sustainability and precision health are more critical than ever, the papers within this issue reflect the cutting-edge advancements and challenges of our time.

Since our registration in 2010 by the RS Ministry of Education and Culture, *Quality of Life* has evolved from a local initiative into a recognized international forum. Published biannually by **Pan-European University “Apeiron” Banja Luka**, our journal has consistently met the highest academic standards.

- **Elite Classification:** Since 2019, we have maintained our status in the first category of scientific journals.
- **Rigorous Peer-Review:** Every article undergoes a stringent double-blind review process by a global network of experts from prestigious university and research institutions.
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In 2026, we are not just observers of scientific progress—we are facilitators. Our editorial strategy is now focused on **enhancing digital visibility, increasing citation impact, and streamlining the editorial cycle** to ensure that vital research reaches the public and scientific community faster than ever.

“Our goal is to foster an environment where high-impact research drives real-world change in public health and environmental protection.”

We wish to extend our heartfelt thanks to:

- **Our Authors:** For choosing *Quality of Life* as the home for your best work.
- **Our Reviewers:** For your invaluable time and feedback that ensures the integrity of our publication.
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We look forward to your future contributions and to another year of advancing the science of living well.

**Warm regards,**  
**The Editorial Board** *Quality of Life Magazine*

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*Original scientific paper*

## PUBLIC KNOWLEDGE OF INFECTIOUS MONONUCLEOSIS: A CROSS-SECTIONAL SURVEY IN THE REPUBLIC OF SRPSKA (B&H)

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**Abstract:** Infectious mononucleosis is a common viral disease, most frequently caused by the Epstein–Barr virus, predominantly affecting adolescents and young adults. Despite its high prevalence, misconceptions regarding disease etiology, transmission routes, and clinical manifestations remain widespread and may influence health-related behavior. The aim of this study was to assess the level of knowledge and awareness of infectious mononucleosis in the general population of the Republic of Srpska, with particular emphasis on disease etiology, transmission, symptom recognition, and prevention, from a health literacy perspective. A cross-sectional survey was conducted in October 2025 using an anonymous online questionnaire. The study included 225 participants aged 17–60 years. Descriptive statistical methods were applied, and differences in knowledge were analyzed according to basic sociodemographic characteristics. Although most respondents (82.7%) had heard of infectious mononucleosis, only 59.6% correctly identified the disease as viral in origin. Contact with saliva was recognized as the primary route of transmission by 65.3% of participants, while a substantial proportion reported incorrect transmission routes. Common symptoms such as fatigue and fever were widely recognized; however, specific clinically relevant manifestations, including splenomegaly and rash, were poorly identified. Women and younger respondents demonstrated higher levels of knowledge. The findings reveal important gaps in public knowledge of infectious mononucleosis, reflecting broader challenges related to health literacy. Targeted public health education focusing on accurate disease information and prevention may contribute to improved awareness, earlier recognition, and more appropriate health-related behavior.

**Keywords:** infectious mononucleosis, Epstein–Barr virus, public awareness, health literacy, cross-sectional study, prevention

## INTRODUCTION

Infectious mononucleosis is an acute systemic viral infection most commonly caused by the Epstein–Barr virus, a ubiquitous human herpesvirus that infects the majority of the global population during childhood or adolescence (Cohen, 2015; Luzuriaga and Sullivan, 2010). While primary infection in early childhood is often asymptomatic, infection acquired during adolescence or early adulthood frequently results in the clinical syndrome of infectious mononucleosis, characterized by fever, lymphadenopathy, sore throat, and pronounced fatigue (Balfour et al., 2015; Dunmire et al., 2018).

The virus is transmitted primarily through contact with saliva, which explains the increased incidence of the disease among adolescents and young adults living in close-contact settings such as schools, dormitories, and households (Cohen, 2015). Although infectious mononucleosis is generally a self-limiting condition, complications such as hepatosplenomegaly, prolonged convalescence, and, in rare cases, splenic rupture may occur, making timely recognition and appropriate management clinically relevant (Luzuriaga and Sullivan, 2010).

From a public health perspective, infectious mononucleosis represents an important example of a common viral disease that is frequently misunderstood by the general population. Several studies have shown that viral infections are often perceived as bacterial in origin, which may lead to inappropriate expectations regarding antibiotic therapy and increased misuse of antimicrobial agents (Berkman et al., 2011). Inadequate understanding of transmission routes and symptomatology may further contribute to delayed healthcare seeking and suboptimal preventive behavior.

Health literacy, defined as the ability of individuals to access, understand, and apply health-related information, has been recognized as a key determinant of individual and population health outcomes (Nutbeam, 2000; Sørensen et al., 2012). Low levels of health literacy have been associated with poorer disease knowledge, reduced adherence to preventive measures, and less effective use of healthcare services (Berkman et al., 2011; Kickbusch et al., 2013). In the context of infectious diseases, insufficient health literacy may facilitate the spread of infection and increase the burden on healthcare systems.

In recent years, the internet and social media have become dominant sources of health intelligence for the general population. While these platforms provide rapid and widespread access to information, they also enable the dissemination of incomplete or misleading content, particularly regarding infectious diseases and their treatment (Eysenbach, 2008). Consequently, assessing population-level knowledge and awareness of common viral infections has become increasingly important for guiding public health education strategies.

Despite the wide geographical distribution of Epstein–Barr virus infection worldwide, data on public awareness of infectious mononucleosis remain limited, particularly in Southeast Europe. To date, no systematic assessment of population-level understanding of infectious mononucleosis has been conducted in the Republic of Srpska. Identifying knowledge gaps related to disease etiology, transmission routes, symptom recognition, and prevention is essential for the development of targeted educational interventions and evidence-based public health policies.

Therefore, the aim of this study was to assess the level of knowledge and awareness of infectious mononucleosis in the general population of the Republic of Srpska, with particular emphasis on disease etiology, routes of transmission, recognition of common and specific symptoms, and preventive measures. In addition, differences in knowledge according to basic sociodemographic characteristics were explored.

## **MATERIALS AND METHODS**

### **STUDY DESIGN**

A cross-sectional study was conducted to assess the level of public knowledge and awareness of infectious mononucleosis in the general population of the Republic of Srpska.

### **PARTICIPANTS**

The study included a total of 225 participants of both sexes, aged between 17 and 60 years, randomly selected. Participation was voluntary, and all respondents provided informed consent prior to completing the questionnaire. Individuals younger than 17 years of age and those who did not complete the questionnaire in full were excluded from the analysis.

The sample consisted of 120 women (53.3%) and 105 men (46.7%). Participants were recruited from both urban and rural areas across the Republic of Srpska, enabling inclusion of individuals with diverse sociodemographic backgrounds.

## QUESTIONNAIRE

Data were collected using a specifically designed anonymous online questionnaire created for the purpose of this study. The questionnaire consisted of 16 questions and was structured into five sections:

1. Sociodemographic characteristics (sex, age group, number of children, place of residence)
2. Previous awareness and experience with infectious mononucleosis
3. Knowledge of disease etiology and routes of transmission
4. Recognition of common and specific symptoms of infectious mononucleosis
5. Attitudes toward prevention and preventive measures

Most questions were of the closed-ended type, with predefined answer options. One question allowed respondents to provide additional information in an open-ended format. The questionnaire was distributed electronically via social media platforms and e-mail.

## DATA COLLECTION

The survey was conducted in October 2025 using the Google Forms platform. The electronic format ensured anonymity and facilitated automatic data recording. Participants were informed about the purpose of the study and the exclusive use of collected data for research purposes. The questionnaire used in this study is provided as Supplementary material.

## STATISTICAL ANALYSIS

Collected data were analyzed using descriptive statistical methods. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean values with standard deviations. Descriptive statistical methods were used to summarize the data. Differences in knowledge and awareness of infectious mononucleosis according to sex and age group were analyzed using the chi-square ( $\chi^2$ ) test. Statistical significance was set at  $p < 0.05$ . Statistical analyses were performed using Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

## RESULTS

### SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

A total of 225 respondents participated in the study. The mean age of participants was  $28.9 \pm 8.4$  years. The largest proportion of respondents belonged to the 17–25 age group (43.1%), followed by those aged 26–35 years (30.2%). Women accounted for 53.3% of the sample, while men represented 46.7%. Most respondents resided in urban areas (68.4%), and the majority reported having no children (62.7%). Detailed sociodemographic characteristics are presented in **Table 1**.

**Table 1.** Sociodemographic characteristics of respondents (n = 225)

| Characteristic     | n   | %    |
|--------------------|-----|------|
| Sex                |     |      |
| Female             | 120 | 53.3 |
| Male               | 105 | 46.7 |
| Age group (years)  |     |      |
| 17–25              | 97  | 43.1 |
| 26–35              | 68  | 30.2 |
| 36–45              | 39  | 17.3 |
| 46–60              | 21  | 9.4  |
| Number of children |     |      |



|                      |     |      |
|----------------------|-----|------|
| None                 | 141 | 62.7 |
| One child            | 57  | 25.3 |
| Two or more children | 27  | 12.0 |
| Place of residence   |     |      |
| Urban                | 154 | 68.4 |
| Rural                | 71  | 31.6 |

### AWARENESS OF INFECTIOUS MONONUCLEOSIS

Most respondents (82.7%) reported that they had previously heard of infectious mononucleosis. However, only 59.6% correctly identified the disease as being of viral origin. A substantial proportion of respondents either believed that the disease was bacterial (21.3%) or were uncertain about its etiology (19.1%).

Regarding sources of information, the internet and social media were the most frequently reported sources (45.2%), followed by formal education (28.5%). Healthcare professionals were cited as the primary source of information by only 16.1% of respondents.

Personal experience with infectious mononucleosis was reported by 14.7% of participants, while 22.2% stated that they knew someone who had previously been affected by the disease.

### KNOWLEDGE OF TRANSMISSION ROUTES AND PREVENTION

Contact with saliva was correctly identified as the main route of transmission by 65.3% of respondents. Nevertheless, 27.1% incorrectly believed that infectious mononucleosis is transmitted via airborne droplets, and 7.6% reported that they did not know the route of transmission.

Most respondents (72.0%) believed that infectious mononucleosis can be prevented. The most commonly reported preventive measures included avoidance of sharing utensils and drinking glasses (61.8%), maintaining personal hygiene (54.2%), and strengthening the immune system (48.9%).

A detailed overview of respondents' knowledge and attitudes is presented in **Table 2**.

**Table 2.** Knowledge and awareness of infectious mononucleosis

| Variable                                                  | Correct / affirmative response (%) |
|-----------------------------------------------------------|------------------------------------|
| Heard of infectious mononucleosis                         | 82.7                               |
| Correctly identified viral etiology                       | 59.6                               |
| Correctly identified saliva contact as transmission route | 65.3                               |
| Recognized fatigue as a symptom                           | 83.1                               |
| Recognized fever as a symptom                             | 78.2                               |
| Recognized enlarged lymph nodes                           | 71.6                               |
| Recognized sore throat                                    | 68.0                               |
| Recognized splenomegaly                                   | 34.7                               |
| Recognized rash                                           | 22.7                               |
| Recognized loss of appetite                               | 19.6                               |
| Believed prevention is possible                           | 72.0                               |

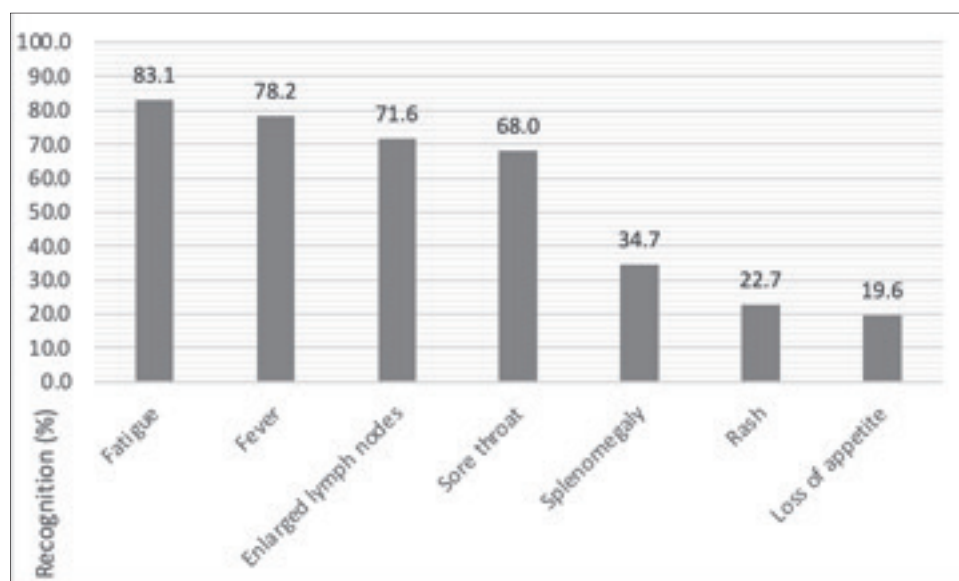
### RECOGNITION OF SYMPTOMS

Recognition of common symptoms of infectious mononucleosis was relatively high. Fatigue and fever were the most frequently identified symptoms, followed by enlarged lymph nodes and sore throat. In contrast, specific clinical manifestations such as splenomegaly, rash, and loss of appetite were identified by fewer than one third of respondents.



Overall, only 28.4% of respondents correctly recognized all major symptoms of infectious mononucleosis. The mean number of correctly identified symptoms was  $4.7 \pm 1.9$  out of a maximum of seven.

Differences in symptom recognition are illustrated in **Figure 1**.



**Figure 1.** Recognition of symptoms of infectious mononucleosis among respondents

**Legend:** Figure 1 presents the proportion of respondents (%) who correctly identified individual symptoms of infectious mononucleosis. Fatigue (83.1%) and fever (78.2%) were the most frequently recognized symptoms, followed by enlarged lymph nodes (71.6%) and sore throat (68.0%). In contrast, specific clinical manifestations such as splenomegaly (34.7%), rash (22.7%), and loss of appetite (19.6%) were considerably less frequently identified.

### DIFFERENCES ACCORDING TO SOCIODEMOGRAPHIC CHARACTERISTICS

Women demonstrated significantly better knowledge of infectious mononucleosis compared to men, particularly regarding symptom recognition and transmission routes ( $p < 0.05$ ). Younger respondents (17–25 years) showed higher overall awareness than older age groups. Respondents with children displayed slightly better knowledge of preventive measures, although these differences were less pronounced.

## DISCUSSION

The present study provides insight into public knowledge and awareness of infectious mononucleosis in the general population of the Republic of Srpska and identifies several gaps of clear relevance for public health practice. Although general awareness of the disease was relatively high, detailed understanding of its etiology, transmission routes, and specific clinical manifestations was limited.

A particularly important finding is that fewer than two thirds of respondents correctly identified infectious mononucleosis as a viral disease. Similar misconceptions regarding the etiology of common viral infections have been widely reported and are often associated with inappropriate expectations regarding antibiotic therapy (Berkman et al., 2011). Such misunderstandings represent a persistent challenge in antimicrobial stewardship and highlight the broader issue of insufficient health literacy in the general population.

Knowledge of transmission routes was moderate. While most respondents correctly recognized saliva contact as the primary route of transmission, more than one quarter believed that the disease is transmitted via airborne droplets. Confusion between different modes of transmission has been described in previous studies addressing public understanding of infectious diseases, particularly in the context of information obtained from non-professional sources (Eysenbach, 2008). This finding suggests that access

to information alone does not guarantee accurate knowledge.

Symptom recognition followed a similar pattern. Common manifestations such as fatigue, fever, sore throat, and lymphadenopathy were widely recognized, which is consistent with the classical clinical description of infectious mononucleosis (Luzuriaga and Sullivan, 2010; Balfour et al., 2015). In contrast, clinically significant signs such as splenomegaly and rash were poorly identified. This lack of awareness is particularly relevant, as unrecognized splenomegaly is associated with an increased risk of splenic rupture, especially among physically active individuals (Cohen, 2015).

Differences in knowledge according to sex and age observed in this study are consistent with findings from previous research on health literacy. Women and younger respondents demonstrated higher levels of awareness, which may reflect greater engagement with health-related information and higher exposure to digital media (Sørensen et al., 2012; Kickbusch et al., 2013). Similar patterns have been described in studies linking health literacy to sociodemographic factors and social determinants of health (Rowlands et al., 2018).

The dominant role of the internet and social media as sources of health information identified in this study reflects global trends in health information-seeking behavior. While these platforms enable rapid dissemination of information, they also facilitate the spread of inaccurate or misleading content. The relatively low reliance on healthcare professionals as information sources suggests an underutilized opportunity for structured patient education within primary healthcare systems.

From a broader public health perspective, the World Health Organization recognizes health literacy as a critical determinant of population health and a prerequisite for effective disease prevention and health promotion (World Health Organization, 2016). The findings of the present study support this view and indicate that improving health literacy related to infectious mononucleosis could contribute to earlier recognition of the disease, more appropriate preventive behavior, and reduced misuse of antibiotics.

Several limitations should be acknowledged. The online design of the survey may have introduced selection bias favoring younger and digitally literate individuals, and self-reported data may overestimate actual knowledge. Nevertheless, the study provides valuable population-based data and identifies clear targets for future public health education initiatives.

## CONCLUSIONS

This study demonstrates that, although general awareness of infectious mononucleosis among the population of the Republic of Srpska is relatively high, substantial gaps persist in knowledge regarding disease etiology, transmission routes, and specific clinical manifestations. While common symptoms such as fatigue, fever, and sore throat are widely recognized, clinically important signs, including splenomegaly and rash, remain poorly understood.

The findings highlight misconceptions related to the viral nature of infectious mononucleosis and confusion regarding its mode of transmission, which may contribute to inappropriate preventive behavior and unrealistic expectations regarding antibiotic therapy. The dominant role of informal information sources, particularly the internet and social media, further emphasizes the need for reliable, evidence-based health communication.

Differences in knowledge according to sex and age indicate that targeted public health education should focus especially on men and older population groups, who demonstrated lower levels of awareness. Strengthening the role of healthcare professionals in patient education and integrating structured health literacy interventions into primary healthcare and educational settings may contribute to improved understanding and earlier recognition of the disease.

Overall, improving population-level health literacy related to infectious mononucleosis represents an important step toward more effective prevention, reduced risk of complications, and more rational use of healthcare resources.

**Conflict of interest:** *The authors declare no conflict of interest.*

## APPENDIX

### Questionnaire used in the study

#### Assessment of knowledge and awareness of infectious mononucleosis

This anonymous online questionnaire was designed to assess the level of knowledge and awareness of the general population regarding infectious mononucleosis. Completion of the questionnaire takes approximately 2–3 minutes. All responses are anonymous and will be used exclusively for research purposes.

#### Sociodemographic data

**1. Gender:**

- ☐ Male
- ☐ Female

**2. Age group:**

- ☐ 17–25 years
- ☐ 26–35 years
- ☐ 36–45 years
- ☐ 46–60 years

**3. Number of children:**

- ☐ None
- ☐ One
- ☐ Two or more

**4. Place of residence:**

- ☐ Urban
- ☐ Rural

#### Knowledge and awareness of infectious mononucleosis

**5. Have you ever heard of infectious mononucleosis?**

- ☐ Yes
- ☐ No

**6. How did you learn about infectious mononucleosis?**

- ☐ Internet / social media
- ☐ Formal education
- ☐ Healthcare professionals
- ☐ Family / acquaintances
- ☐ Other: \_\_\_\_\_

**7. Have you personally had infectious mononucleosis?**

- ☐ Yes  
☐ No

**8. Do you know someone who has had infectious mononucleosis?**

- ☐ Yes  
☐ No

**9. What is the cause of infectious mononucleosis?**

- ☐ Virus (Epstein–Barr virus)  
☐ Bacteria  
☐ Not sure

**10. What is the main mode of transmission of infectious mononucleosis?**

- ☐ Contact with saliva  
☐ Airborne droplets  
☐ Via contaminated objects  
☐ Not sure

**Recognition of symptoms****11. Is fatigue/exhaustion a symptom of infectious mononucleosis?**

- ☐ Yes  
☐ No  
☐ Not sure

**12. Is fever a symptom of infectious mononucleosis?**

- ☐ Yes  
☐ No  
☐ Not sure

**13. Are enlarged lymph nodes a symptom of infectious mononucleosis?**

- ☐ Yes  
☐ No  
☐ Not sure

**14. Is sore throat a symptom of infectious mononucleosis?**

- ☐ Yes  
☐ No  
☐ Not sure

**15. Are enlarged spleen, rash, or loss of appetite symptoms of infectious mononucleosis?**

- ☐ Yes  
☐ No  
☐ Not sure

**Prevention**

## 16. Which of the following preventive measures do you consider effective?

(Multiple answers allowed)

- ☐ Avoiding sharing utensils and drinking glasses
- ☐ Maintaining personal hygiene
- ☐ Strengthening the immune system
- ☐ Infectious mononucleosis cannot be prevented
- ☐ Not sure

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# MANAGEMENT PRACTICES AND PROFESSIONAL BURNOUT AMONG HEALTHCARE PROFESSIONALS: A CROSS-SECTIONAL STUDY

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**Abstract:** Professional burnout represents a significant occupational risk among healthcare professionals due to high work demands, emotional strain, and the continuous responsibility associated with patient care. Organizational factors, including management practices and work organization, play an important role in maintaining employees' well-being and preventing burnout. The aim of this study was to examine the role of management practices in the prevention and management of professional burnout among healthcare professionals. A cross-sectional study design was applied. The sample consisted of 30 healthcare professionals employed in secondary and tertiary healthcare institutions. Data were collected using the standardized Job Demands–Resources Questionnaire (Schaufeli, 2015). Descriptive statistical, correlation, and reliability analyses were used to evaluate the collected data. The majority of participants were female (83.2%), with a mean age of 30.83 years. Nurses constituted the largest professional group (56.7%), with an average work experience of 12.2 years. Overall satisfaction with work organization and human resource management was moderate. The mean burnout score was  $2.24 \pm 0.23$ , indicating a relatively low level of professional burnout among the respondents. The findings suggest that organizational factors and management practices play an important role in maintaining employee well-being. In particular, supportive interpersonal relations within healthcare teams appear to be associated with lower levels of professional burnout. Strengthening leadership practices, improving work organization, and providing adequate institutional support for healthcare professionals may contribute to the prevention of professional burnout and improvement of healthcare service quality.

**Keywords:** professional burnout, healthcare professionals, management practices, organizational factors, job demands–resources model

## INTRODUCTION

Professional burnout is a psychological syndrome that arises as a consequence of chronic workplace stress that has not been successfully managed (Maslach et al., 2001; Maslach and Leiter, 2016). It is characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach and Leiter, 2016; Leiter and Maslach, 2017). Healthcare professionals represent one of the occupational groups most vulnerable to burnout due to the demanding nature of their work, continuous exposure to stressful situations, and responsibility for patient care (Maslach and Leiter, 2016; Dall'Ora et al., 2016).

Healthcare systems worldwide face numerous organizational challenges, including increasing workload, staff shortages, and growing expectations regarding the quality of healthcare services. These factors significantly affect the working conditions of healthcare professionals and may contribute to the development of professional burnout (Aiken et al., 2014; West et al., 2018; World Health Organization, 2019).

Previous research has shown that organizational factors, particularly management practices and leadership styles, play an important role in preventing burnout and promoting employee well-being (Armstrong and Taylor, 2017; Gómez-Mejía et al., 2016; Montgomery et al., 2019).

The Job Demands–Resources (JD-R) model provides an important theoretical framework for understanding burnout in the workplace, suggesting that job demands may increase the risk of burnout, while job resources such as organizational support and effective leadership may reduce these risks and enhance

employee motivation (Schaufeli, 2015; Bakker and Demerouti, 2007; Bakker and Demerouti, 2017; Chirico, 2016).

Despite the growing body of research on professional burnout among healthcare workers, the role of management practices and organizational factors in shaping employee well-being requires further investigation.

### **AIM OF THE STUDY**

The aim of this study was to examine the role of management in the prevention and management of professional burnout among healthcare professionals.

## **MATERIALS AND METHODS**

### **STUDY DESIGN**

A cross-sectional study design was applied to examine the relationship between management practices and professional burnout among healthcare professionals.

### **PARTICIPANTS**

The study included 30 healthcare professionals employed in secondary and tertiary healthcare institutions in Belgrade, Serbia, including the Clinical Center of Serbia – Clinic for Endocrinology, Diabetes and Metabolic Diseases and the City Hospital in Belgrade. Participants included nurses, physicians, and other healthcare professionals involved in direct patient care. A convenience sampling approach was used to recruit participants who were available and willing to participate in the study.

### **DATA COLLECTION**

Data were collected using a standardized questionnaire based on the Job Demands–Resources (JD-R) model (Schaufeli, 2015; Bakker and Demerouti, 2017). The instrument used in this study was the Job Demands–Resources Questionnaire developed by Schaufeli (2015).

The questionnaire consisted of several sections addressing:

- sociodemographic characteristics of participants
- work organization and management practices
- job demands and job resources
- interpersonal relations within the institution
- indicators of professional burnout

Participants completed the questionnaire voluntarily and anonymously. No personal identifying information was collected.

### **ETHICAL CONSIDERATIONS**

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Participation in the study was voluntary and anonymous. All respondents were informed about the purpose of the research and provided informed consent prior to completing the questionnaire.

### **STATISTICAL ANALYSIS**

Statistical data analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 22. Descriptive statistical methods were applied. Numerical variables were presented as means and standard deviations, while categorical variables were presented as frequencies and percentages. The level of statistical significance was set at  $p < 0.05$ .



Internal consistency of the instrument was assessed using Cronbach's Alpha coefficient. The obtained Cronbach's Alpha value was  $\alpha = 0.699$ , while the standardized Cronbach's Alpha coefficient was  $\alpha = 0.704$  for a total of 49 items. These findings indicate an acceptable level of internal consistency of the instrument, suggesting that the questionnaire items adequately measured the same construct and demonstrated acceptable reliability for further statistical analysis.

## RESULTS

A total of 30 healthcare professionals participated in the study.

The sociodemographic characteristics of the respondents are presented in Table 1.

The majority of respondents were female, while male participants represented a smaller proportion of the sample. The mean age of the participants was  $30.83 \pm 9.34$  years, with ages ranging from 24 to 59 years. Nurses constituted the largest professional group, followed by medical technicians, while other professional categories were represented in smaller numbers. The mean work experience of the respondents was  $12.21 \pm 8.80$  years.

**Table 1.** Sociodemographic characteristics of participants (N = 30)

| Variable        | Category           | n                | %    |
|-----------------|--------------------|------------------|------|
| Gender          | Female             | 25               | 83.2 |
|                 | Male               | 5                | 16.8 |
| Age (years)     | Mean $\pm$ SD      | $30.83 \pm 9.34$ |      |
|                 | Min–Max            | 24–59            |      |
| Work position   | Nurse              | 17               | 56.7 |
|                 | Medical technician | 5                | 16.7 |
|                 | Senior nurse       | 2                | 6.7  |
|                 | Personal assistant | 2                | 6.7  |
|                 | Head nurse         | 1                | 3.3  |
|                 | Teacher            | 1                | 3.3  |
|                 | Other              | 2                | 6.7  |
| Marital status  | Married            | 20               | 67.9 |
|                 | Single             | 7                | 25.0 |
|                 | Divorced           | 3                | 7.1  |
| Work experience | Mean $\pm$ SD      | $12.21 \pm 8.80$ |      |
|                 | Min–Max            | 3–37             |      |

Two questionnaires contained incomplete responses in sections related to organizational climate and were excluded from domain-specific analyses; therefore, the number of valid responses for Tables 2–4 was N = 28.

The evaluation of satisfaction with work organization by management is presented in **Table 2**. Overall, respondents reported moderate levels of satisfaction with work organization and management practices. The highest mean value was observed for the statement indicating that the institution is highly formalized and structured, while relatively high scores were also recorded for the perception that supervisors expect adherence to rules.

**Table 2.** Work organization and management practices

| Statement                                                    | N  | Min | Max | Mean | SD   |
|--------------------------------------------------------------|----|-----|-----|------|------|
| The institution represents a supportive working environment. | 28 | 1   | 5   | 3.11 | 1.10 |
| The institution is a dynamic and entrepreneurial place.      | 28 | 1   | 5   | 2.61 | 1.10 |
| The institution is highly formalized and structured.         | 28 | 1   | 5   | 3.46 | 1.17 |
| The institution is strongly production-oriented.             | 28 | 1   | 5   | 2.54 | 1.17 |
| Supervisors are warm and caring mentors.                     | 28 | 1   | 5   | 3.04 | 1.26 |
| Supervisors encourage innovation.                            | 28 | 1   | 5   | 2.81 | 1.41 |
| Supervisors expect adherence to rules.                       | 28 | 1   | 5   | 3.29 | 1.30 |

Results related to satisfaction with human resource management and incentives provided by leadership are presented in **Table 3**. Respondents generally reported moderate perceptions of management practices. The highest mean score was observed for the statement that the institution emphasizes human resources, followed by recognition of the importance of initiative in professional work. Lower scores were observed for the perception that rewards are distributed equally among employees.

**Table 3.** Mean scores of human resource management and incentive practices

| Statement                                   | N  | Min | Max | Mean | SD   |
|---------------------------------------------|----|-----|-----|------|------|
| The institution emphasizes human resources. | 28 | 1   | 5   | 3.61 | 1.19 |
| The institution emphasizes growth.          | 28 | 1   | 5   | 3.39 | 1.19 |
| The institution emphasizes stability.       | 28 | 1   | 5   | 3.25 | 1.19 |
| The institution emphasizes competitiveness. | 28 | 1   | 5   | 3.25 | 1.47 |
| Rewards distributed equally.                | 28 | 1   | 5   | 2.11 | 1.25 |
| Rewards based on initiative.                | 28 | 1   | 5   | 3.59 | 1.18 |

The results concerning interpersonal relations among healthcare professionals are presented in **Table 4**. Respondents generally reported positive perceptions of collegial relationships within their institutions. The highest mean value was recorded for the statement that employees respect one another, while teamwork during periods of increased workload was also highly rated.

**Table 4.** Satisfaction with interpersonal relations in the institution

| Statement                        | N  | Min | Max | Mean | SD   |
|----------------------------------|----|-----|-----|------|------|
| Employees support one another    | 28 | 1   | 5   | 3.29 | 0.81 |
| Employees work as a team         | 28 | 1   | 5   | 3.61 | 0.83 |
| Employees respect one another    | 28 | 1   | 5   | 3.70 | 0.91 |
| Employees help other departments | 28 | 1   | 5   | 3.32 | 1.24 |

To provide an overall assessment of organizational factors, mean scores of the main organizational domains were calculated and are presented in **Table 5**. Among the analyzed domains, the highest level of satisfaction was observed in interpersonal relations, while satisfaction with human resource management practices and work organization showed slightly lower values.

**Table 5.** Mean scores of organizational domains

| Domain                                    | Mean score |
|-------------------------------------------|------------|
| Satisfaction with work organization       | 2.85       |
| Satisfaction with HR management           | 2.93       |
| Satisfaction with interpersonal relations | 3.56       |
| Overall organizational domain score       | 3.11       |

The level of professional burnout among healthcare professionals was also assessed. The results presented in Table 6 indicate that the mean burnout score was  $2.24 \pm 0.23$ , suggesting a relatively low level of burnout symptoms among the participants. Correlation analysis was conducted to examine the relationship between organizational factors and professional burnout.

A statistically significant negative correlation was observed between interpersonal relations and professional burnout ( $r = -0.412$ ,  $p = 0.040$ ), indicating that better interpersonal relations within healthcare teams are associated with lower levels of burnout.

**Table 6.** Professional burnout and correlations with organizational domains

| Variable                                       | Value                        |
|------------------------------------------------|------------------------------|
| Burnout (Mean $\pm$ SD)                        | $2.24 \pm 0.23$              |
| Correlation: work organization – burnout       | $r = 0.009$ , $p = 0.968$    |
| Correlation: HR management – burnout           | $r = 0.068$ , $p = 0.771$    |
| Correlation: interpersonal relations – burnout | $r = -0.412$ , $p = 0.040^*$ |

\*Statistically significant at  $p < 0.05$

## DISCUSSION

Professional burnout represents one of the most significant challenges in modern healthcare systems due to the high emotional demands, responsibility for patient care, and organizational pressures faced by healthcare professionals (Maslach and Leiter, 2016; Schaufeli, 2015). Understanding the role of organizational factors in the development or prevention of burnout is therefore essential for improving employee well-being and maintaining the quality of healthcare services.

The findings of this study indicate that organizational characteristics and management practices play an important role in shaping the working environment of healthcare professionals. Although respondents generally perceived the organizational structure as relatively stable and formalized, the overall evaluation of work organization and management practices remained at moderate levels of satisfaction, as reflected in the mean domain scores. Such findings may suggest that employees perceive the organizational system as functional, but not necessarily strongly supportive or motivating. Previous research has shown that organizational climate and leadership style significantly influence employee well-being, work engagement, and job satisfaction among healthcare professionals (Bakker and Demerouti, 2017; West et al., 2018). In this context, effective management practices may represent an important resource for healthcare employees, particularly in demanding clinical environments.

Human resource management practices represent an important component of organizational functioning in healthcare institutions. In the present study, respondents recognized the importance of human resources, staff cohesion, and professional initiative within their institutions. These findings suggest that employees value working environments in which professional development, collaboration, and innovation are encouraged. At the same time, perceptions related to fairness in reward distribution appeared less

favorable. Similar challenges have been described in previous studies, which suggest that limited organizational resources and rigid administrative structures may negatively affect employees' perceptions of fairness and recognition within healthcare institutions (Armstrong and Taylor, 2017; Montgomery et al., 2019). These findings highlight the importance of transparent management practices and equitable reward systems in strengthening employee motivation and organizational commitment.

Interpersonal relations within the workplace emerged as the most positively perceived aspect of the organizational environment. Supportive relationships among colleagues, teamwork, and mutual respect represent important elements of a healthy work climate in healthcare institutions and may act as protective factors against professional burnout. Previous studies have consistently demonstrated that strong collegial support can mitigate work-related stress and contribute to higher levels of job satisfaction among healthcare professionals (Adams and Bond, 2000; Bakker and Demerouti, 2017). In complex healthcare settings where multidisciplinary cooperation is essential, positive interpersonal relationships may function as protective factors against professional exhaustion.

Another important finding of this study relates to the low level of professional burnout observed among respondents.

The relatively low burnout score observed in this study ( $M = 2.24 \pm 0.23$ ) should also be interpreted cautiously. Several factors may explain these findings. First, supportive interpersonal relations within healthcare teams may have acted as an important protective factor against emotional exhaustion and occupational stress. Second, the relatively small sample size and convenience sampling approach may have influenced the representativeness of the results. Additionally, participants may have been inclined toward socially desirable responses, particularly considering the sensitive nature of questions related to occupational stress and burnout. Institutional context and specific organizational characteristics of the included healthcare facilities may also have contributed to the lower reported burnout levels.

These findings may suggest that despite moderate satisfaction with certain organizational aspects, employees maintain a degree of resilience within their work environment. One possible explanation may be the presence of supportive interpersonal relations within teams, which can buffer the negative effects of organizational stressors. Social support within healthcare teams has been widely recognized in the literature as a key factor contributing to coping with occupational stress and preventing emotional exhaustion (Schaufeli, 2015; Greenglass, Burke and Fiksenbaum, 2001; Hall et al., 2016; Morgantini et al., 2020).

From a theoretical perspective, these findings may also be interpreted within the framework of the Job Demands–Resources (JD-R) model, which suggests that job demands increase the risk of burnout, whereas job resources such as organizational support, teamwork, and effective leadership may reduce stress and promote work engagement (Bakker and Demerouti, 2017). In this context, supportive interpersonal relationships and constructive management practices may function as important organizational resources that help healthcare professionals cope with demanding work conditions.

The findings of this study may also be interpreted in line with the World Health Organization (WHO) perspective, which recognizes burnout as an occupational phenomenon resulting from chronic workplace stress that has not been successfully managed (World Health Organization, 2019). According to the ICD-11 classification, burnout is specifically associated with the occupational context and should not be applied to other areas of life. In this regard, organizational responsibility becomes particularly important, emphasizing the need for healthcare institutions to implement preventive strategies aimed at improving working conditions, organizational support, and employee well-being.

Leadership style represents an important organizational factor associated with employee well-being and burnout prevention. Previous studies have shown that transformational and supportive leadership styles

may positively influence employee motivation, resilience, and job satisfaction, while simultaneously reducing emotional exhaustion and occupational stress (West et al., 2020; Bakker, Demerouti and Sanz-Vergel, 2014). Leaders who encourage open communication, teamwork, employee participation in decision-making, and professional recognition contribute to the development of healthier work environments and stronger organizational support systems within healthcare institutions.

Organizational culture also plays a significant role in shaping occupational well-being among healthcare professionals. Supportive organizational cultures characterized by trust, mutual respect, effective communication, teamwork, and employee-centered management approaches may contribute to lower levels of professional burnout. In contrast, highly formalized organizational climates with limited communication and reduced institutional support may negatively affect employee satisfaction and psychological well-being. Creating positive organizational climates within healthcare institutions should therefore represent an important strategic priority for healthcare management (De Hert, 2020).

Furthermore, the observed relationship between interpersonal relations and burnout highlights the importance of collaborative workplace culture in healthcare institutions. Positive communication, teamwork, and mutual professional respect may strengthen employees' psychological resilience and contribute to maintaining professional engagement even in demanding work environments.

Despite these findings, the study has several limitations that should be considered when interpreting the results. The relatively small sample size ( $N = 30$ ) limits the generalizability of the findings to broader populations of healthcare professionals. Additionally, the use of convenience sampling may have introduced selection bias, as participation depended on respondents' availability and willingness to participate in the study. The cross-sectional study design also limits the ability to establish causal relationships between organizational factors and professional burnout. Furthermore, self-reported data may be influenced by socially desirable responses and subjective perceptions of workplace conditions. Future research should include larger multicenter samples, longitudinal study designs, and more advanced statistical methods in order to provide a more comprehensive understanding of the relationship between organizational factors, management practices, and professional burnout among healthcare professionals.

Overall, the findings of this study emphasize the importance of organizational climate and leadership practices for maintaining employee well-being in healthcare institutions. Strengthening supportive management approaches, improving communication within teams, and ensuring fair recognition of employees' contributions may represent important strategies for preventing professional burnout among healthcare professionals.

## CONCLUSION

Professional burnout represents an important challenge for healthcare systems due to the demanding nature of healthcare work and increasing organizational pressures faced by healthcare professionals. The findings of this study highlight the significant role of organizational factors, particularly management practices and interpersonal relations within healthcare teams, in shaping employees' work experiences and psychological well-being.

The results indicate that supportive leadership, effective work organization, and positive interpersonal relationships among colleagues may serve as important protective factors against professional burnout. These findings highlight the importance of interpersonal relationships as a key organizational resource that may reduce the risk of professional burnout among healthcare professionals. Furthermore, the results contribute to the existing body of knowledge on occupational health in healthcare settings by emphasizing the importance of organizational climate and management approaches in maintaining employee well-being.



From a practical perspective, the results of this study may support healthcare managers and policymakers in developing strategies aimed at improving work organization, strengthening teamwork, and enhancing institutional support for healthcare professionals. The implementation of such organizational strategies may contribute to the prevention of professional burnout, improved job satisfaction, and the overall quality of healthcare services.

Healthcare managers and decision-makers should consider implementing organizational interventions focused on strengthening supportive leadership approaches, improving communication within healthcare teams, promoting employee participation in organizational processes, and ensuring fair recognition of employees' contributions. Furthermore, continuous mental health support programs, stress management education, and institutional strategies aimed at improving working conditions may contribute to reducing professional burnout and enhancing the quality and sustainability of healthcare services.

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*Original scientific paper*

# INTERNAL COMMUNICATION AND COMMUNICATION CLIMATE IN A TERTIARY HEALTHCARE INSTITUTION: IMPLICATIONS FOR QUALITY OF WORK LIFE

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**Abstract: Background:** Internal communication constitutes a fundamental organisational element in healthcare institutions, influencing employee satisfaction, teamwork, and the broader communication climate. Given the complexity and hierarchical structure of tertiary healthcare centres, robust communication mechanisms are vital for coordination, patient safety, and organisational stability. This study evaluated employee satisfaction with internal communication at the University Clinical Centre of the Republic of Srpska, with particular attention to vertical and horizontal communication, electronic communication usage, information availability, and the communication climate. **Methods:** A cross-sectional quantitative study was implemented using a structured questionnaire based on a five-point Likert scale. The sample comprised 300 employees representing diverse departments and hierarchical levels. Composite mean scores were computed for each communication dimension. The Agreement Index, employing the top-two box method, was used to determine the proportion of respondents with positive evaluations. **Results:** The overall composite score for internal communication was  $M = 3.88$ , indicating generally positive perceptions among employees. Satisfaction was highest for communication with immediate supervisors ( $M = 4.12$ ; 82% agreement) and horizontal communication ( $M = 4.06$ ; 75% agreement). Moderate levels of agreement were observed for information availability ( $M = 3.81$ ; 55% agreement) and electronic communication usage ( $M = 3.42$ ; 52% agreement). Communication satisfaction varied between immediate supervisors and higher-level management, demonstrating differences across hierarchical levels. **Conclusion:** Internal communication within the institution is generally perceived positively; however, variation across specific dimensions suggests opportunities for improvement, particularly regarding information flow and electronic communication management. Targeted organisational interventions may further strengthen the communication climate and institutional cohesion.

**Keywords:** internal communication, healthcare organisations, communication climate, employee satisfaction, vertical communication, horizontal communication, electronic communication

## INTRODUCTION

Healthcare organisations operate within complex systems characterised by specialised professional roles, hierarchical structures, and interdisciplinary teamwork. In such environments, effective internal communication represents a foundational element that supports high-quality patient care and reduces medical errors. Beyond facilitating information exchange, internal communication shapes institutional culture, professional trust, employee engagement, well-being, and overall organisational performance. A supportive interdisciplinary communication environment can facilitate collaborative interactions among healthcare professionals, particularly in complex care settings where team coordination is critical (Gans et al., 2024). Consequently, the influence of internal communication extends beyond clinical interactions, profoundly shaping the broader organisational climate.

Effective communication and teamwork are essential for healthcare delivery, as deficiencies in these domains are associated with challenges in team coordination and organisational efficiency. Studies on

multidisciplinary team functioning underscore the complexity of communication processes within clinical environments (Horlait et al., 2021), while other research demonstrates that improved communication correlates with enhanced teamwork and healthcare efficiency (Meneses-La-Riva et al., 2025). In complex clinical contexts, inadequate communication patterns can hinder coordinated care and contribute to organisational bottlenecks. Fragmented or inefficient communication channels have been identified as significant barriers to effective teamwork and collaboration in healthcare settings. Qualitative investigations into interdisciplinary and multidisciplinary communication reveal that communication challenges may lead to coordination difficulties and interprofessional tensions (Gans et al., 2024; Razzaq et al., 2025). In contrast, qualitative and organisational research indicates that effective communication practices facilitate collaborative processes and foster shared understanding among healthcare professionals (Rivera et al., 2023; Ellen et al., 2020).

Internal communication within healthcare institutions can be broadly classified into three interconnected forms: vertical communication between management and staff, horizontal communication among peers at the same hierarchical level, and interdisciplinary communication across different healthcare professions.

Vertical communication enables the transmission of strategic goals, policy updates, and performance expectations, as well as upward feedback from employees (Yukl, 2013). Effective vertical communication is associated with leadership credibility and perceptions of organisational justice. Communication between middle management and frontline staff has also been linked to improved coordination and collaborative practice within clinical teams (Pettersen, 2024).

Horizontal communication involves interactions among healthcare professionals at similar organisational levels, including nurses, physicians, and allied health professionals. This form of communication strengthens teamwork, enhances coordination, and reduces the risk of clinical errors. By fostering collaboration and mutual support, horizontal communication directly contributes to service quality and organisational resilience.

Interdisciplinary communication involves collaborative exchanges among professionals from diverse disciplines to improve patient care. Evidence from interprofessional settings demonstrates that higher-quality communication is associated with greater team participation and more positive perceptions of care among patients and staff (Erjavec et al., 2022). Due to the interdependent nature of healthcare work, effective interdisciplinary communication is essential for integrated decision-making and continuity of care.

Beyond structural forms, healthcare communication can be formal or informal. Formal communication establishes protocols, disseminates critical information, and ensures regulatory compliance. In contrast, informal communication strengthens interpersonal relationships, trust, and team cohesion. A balanced integration of formal and informal communication mechanisms is essential for maintaining patient safety and fostering a supportive organisational culture.

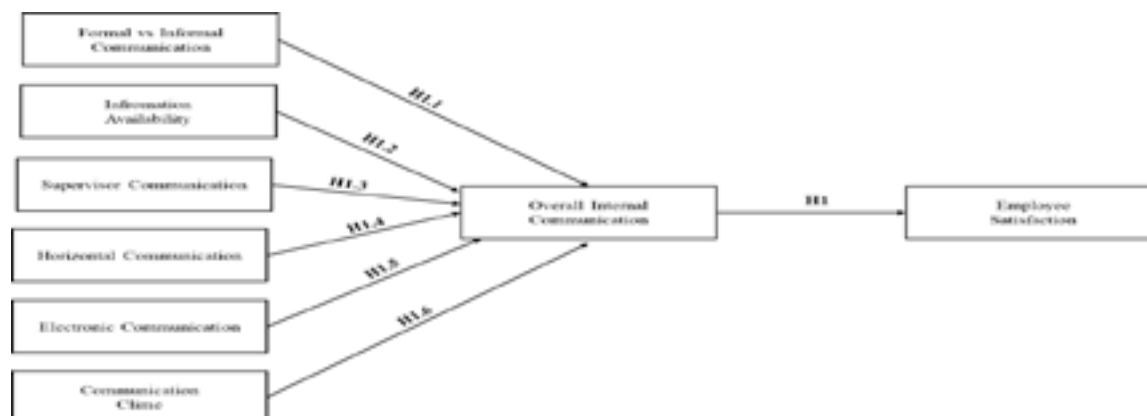
This study investigates employee satisfaction with internal communication at the University Clinical Centre of the Republic of Srpska. It focuses on vertical communication between employees and management, horizontal communication among employees at the same hierarchical level, and the predominant formal and informal communication channels, including electronic media, as well as the communication climate, which reflects organisational belonging. The study assesses the availability and transparency of information, the openness of communication with immediate managers, the level of mutual support and cohesion among employees, and perceptions of the overall communication climate and organisational belonging. The objective is to evaluate internal communication as a significant organisational factor influencing the work environment and professional efficiency within a healthcare organisation.

According to the study objective, the hypothesis is defined as follows:

**H1:** A positive internal communication climate is reflected in high employee satisfaction with communication processes.

**H1.1:** The majority of employees indicate that they obtain work-related information primarily through formal communication channels.

**H1.2:** Employees report satisfaction with the availability and quantity of information at the institutional level.



**Figure 1.** Conceptual framework of study

**Source:** Authors

**H1.3:** Employees perceive communication with their immediate supervisor as open and transparent.

**H1.4:** Employees perceive horizontal communication within the institution as positive, contributing to team cohesion and a culture of mutual support.

**H1.5:** Electronic communication represents one of the dominant forms of communication within the institution.

**H1.6:** Employees perceive the communication climate within the institution as positive, which is reflected in a stronger sense of organisational belonging.

## METODOLOGY

### STUDY DESIGN

A quantitative, cross-sectional research design was employed to assess the quality of internal communication and evaluate communication practices within the University Clinical Centre of the Republic of Srpska. The study examined employees' perceptions of key dimensions of internal communication, including information availability, communication with supervisors, horizontal communication among colleagues, use of communication media, feedback practices, and the overall communication climate.

### INSTRUMENT DEVELOPMENT

A questionnaire was developed specifically for this study and organised into thematic sections addressing key dimensions of internal communication. The instrument was constructed to assess the following aspects (Table 1).

**Table 1.** Instrument design and structure

| Section                                       | Number of items |
|-----------------------------------------------|-----------------|
| Socio-demographic characteristics             | 7               |
| Communication channels (formal vs informal)   | 3               |
| Information availability                      | 7               |
| Supervisor communication (including feedback) | 16              |
| Horizontal communication                      | 7               |
| Electronic communication usage                | 7               |
| Communication climate                         | 5               |

Source: Authors

### SAMPLE DESCRIPTIONS

The questionnaire was administered to employees from various departments and hierarchical levels. In total, 300 valid responses were obtained, establishing a strong empirical basis for evaluating internal communication practices. Most respondents (76.7%) worked in organisational units with more than 40 members. Table 2 presents the detailed socio-demographic characteristics of the sample.

### DATA COLLECTION PROCEDURE

Data were collected using a structured survey consisting of closed-ended questions measured on a five-point Likert scale (e.g., from “Strongly disagree” to “Strongly agree,” “Very dissatisfied” to “Extremely satisfied,” “Always” to “Never,” and “Very good” to “Bad”). This format enabled respondents to indicate the intensity of their perceptions.

The survey method facilitated standardized data collection and quantitative analysis of employees’ perceptions across multiple dimensions of internal communication.

Anonymity of respondents was maintained to promote openness and minimize response bias, thereby strengthening the validity of the collected data.

The survey was administered between July and August 2024. Approval for the research was obtained from the Director of the University Clinical Centre of the Republic of Srpska prior to data collection.

Participation was voluntary. Respondents were informed about the purpose of the research and assured of the confidentiality of their responses.

### CALCULATION COMPOSITE SCORE

Composite scores for each communication dimension were determined by calculating the arithmetic mean of all items within the corresponding section of the questionnaire. As all items were measured on a five-point Likert scale (1–5), higher scores reflected more favourable perceptions of internal communication.

The overall mean score for each dimension was computed as follows:

$$M = \frac{\sum_{i=1}^N C_i}{N} \quad (1)$$

where:

$C_i$  represents the composite score for respondent  $i$ ,

$N$  denotes the total number of respondents ( $N = 300$ ).

Standard deviation (SD) was calculated to assess variability within each communication dimension. It was computed using the following formula:

$$SD = \frac{\sqrt{\sum_{i=1}^N (C_i - M)^2}}{N-1} \quad (2)$$

where:

$C_i$  represents the composite score of respondent  $i$ ,

$M$  denotes the mean value of the dimension,

$N$  is the total number of respondents.

The standard deviation was calculated to assess the dispersion of respondents' composite scores around the overall mean. Lower standard deviation values indicate greater agreement among respondents, whereas higher values reflect increased variability in perceptions.

### CALCULATION OF AGREEMENT INDEX

In addition to mean scores and standard deviations, an Agreement Index (AI) was calculated to facilitate a more intuitive interpretation of respondents' attitudes. The Agreement Index represents the proportion of respondents who selected the two most positive response categories on a five-point Likert scale, such as "strongly agree" and "agree," "very good" and "good," or "extremely satisfied" and "satisfied or „always and often."

The Agreement Index was computed using the following formula:

$$AI = \frac{n_{positive}}{N} \times 100 \quad (3)$$

where  $n_{positive}$  denotes the number of respondents selecting positive response categories, and  $NN$  represents the total number of valid responses.

This approach, commonly known as the "top-two box" method, facilitates a clear and policy-relevant presentation of positive response rates. It complements mean-based analyses and maintains the ordinal structure of Likert-scale data.

### STATISTICAL ANALYSIS

Data were analysed using IBM SPSS Statistics (Version 26.0; IBM Corp., 2019) and Microsoft Excel. Descriptive statistical methods summarised the data, including frequencies, percentages, means ( $M$ ), and standard deviations ( $SD$ ).

Composite scores for each communication dimension were calculated as the arithmetic mean of the relevant items. These aggregated indices provided an overall assessment of internal communication components. Due to the descriptive nature of the study, results are primarily presented as composite mean scores and percentage distributions to offer an empirical overview of communication patterns within the institution.

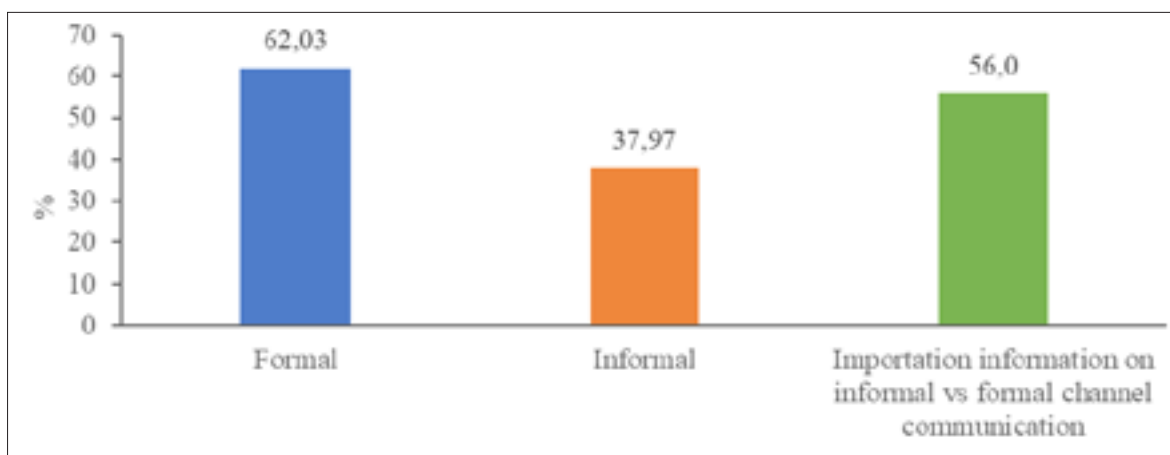
## RESULTS

A total of 300 employees participated in the study. The majority of respondents were female (74.3%). The largest age groups were 20–29 years and 40–59 years, each comprising 34.3% of the sample. Nurses constituted the predominant professional group (79.0%). Most participants did not hold management positions (91.0%). Approximately half of the participants reported 2–4 or 5–9 years of professional experience (Table 2).

**Table 2** Socio-demographic characteristic respondents

| Variable                        |                    | Sample |       |
|---------------------------------|--------------------|--------|-------|
|                                 |                    | N      | %     |
| <b>Gender</b>                   | Male               | 77     | 25.67 |
|                                 | Female             | 223    | 74.33 |
| <b>Age group</b>                | Less than 19 years | 2      | 0.67  |
|                                 | 20 – 29 years      | 103    | 34.33 |
|                                 | 30 – 39 years      | 69     | 23.00 |
|                                 | 40 – 59 years      | 103    | 34.33 |
|                                 | 60 years and above | 23     | 7.67  |
|                                 |                    |        |       |
| <b>Job</b>                      | Nurse              | 237    | 79.0  |
|                                 | Medical doctor     | 52     | 17.33 |
|                                 | Others             | 11     | 3.67  |
| <b>Manager position</b>         | Yes                | 27     | 9.0   |
|                                 | No                 | 273    | 91.0  |
| <b>Years of work experience</b> | Less than 1 year   | 37     | 12.33 |
|                                 | 2 – 4 years        | 63     | 21.0  |
|                                 | 5 – 9 years        | 78     | 26.0  |
|                                 | 10 – 14 years      | 28     | 9.33  |
|                                 | 15 – 19 years      | 31     | 10.33 |
|                                 | 20 years and above | 63     | 21.0  |
|                                 |                    |        |       |

Source: Authors

**Figure 2** Formal vs Informal Channel Communication and Importance

Source: Authors

Within the organisation, formal communication channels predominate (62.03%). However, 56% of participants emphasise the significance of informal channels (Figure 2).

**Table 3** Composite score of the internal communication dimension

| Communication dimension        | Mean (M) | Standard deviation (SD) |
|--------------------------------|----------|-------------------------|
| Information availability       | 3.51     | 0.93                    |
| Supervisor communication       | 4.12     | 1.04                    |
| Horizontal communication       | 4.06     | 0.98                    |
| Electronic communication usage | 3.42     | 1.17                    |



|                                       |      |      |
|---------------------------------------|------|------|
| <b>Communication climate</b>          | 3.76 | 1.16 |
| <b>Overall internal communication</b> | 3.88 | 1.04 |

Source: Authors

The overall composite score for satisfaction with internal communication was  $M = 3.88$ , reflecting generally positive evaluations across assessed dimensions. The lowest composite scores were reported for information availability at the institutional level, electronic communication usage, and communication climate (approximately  $M = 3.42$ – $3.76$ ). The highest composite score pertained to communication with immediate supervisors ( $M = 4.12$ ), followed by horizontal communication and communication climate ( $M = 4.06$ ). Notably, a difference emerged between vertical communication with immediate supervisors ( $M = 4.12$ ) and communication with higher-level management ( $M = 3.51$ ) (Table 3).

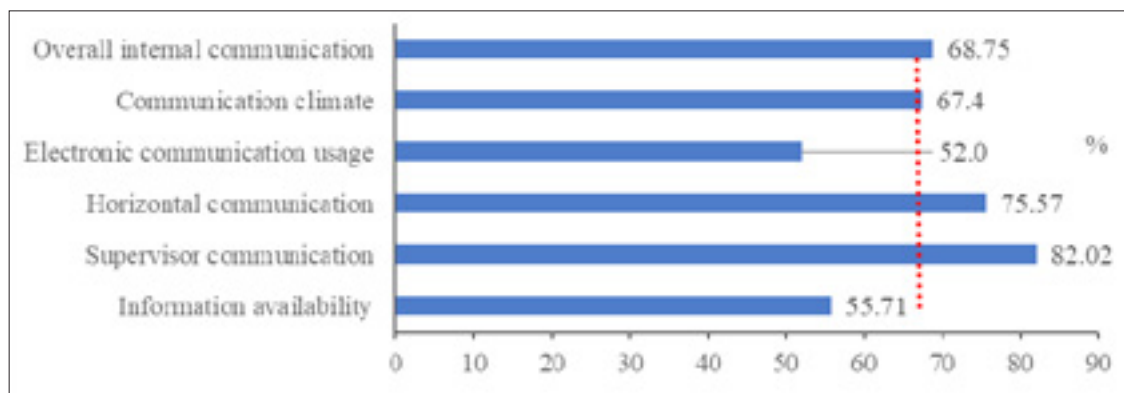


Figure 3. Approved index of the internal communication dimension

Source: Authors

Across all analysed dimensions of internal communication, over 60% of respondents reported positive evaluations. The communication climate dimension demonstrated a comparable level of agreement.

Electronic communication use and information flow from management exhibited similar levels of agreement, with approximately 50% of respondents expressing positive views. This moderate agreement may result from differences in familiarity, role expectations, or organisational context. Given that most respondents were under 50 years of age, generational factors may also influence these findings. Further analysis is required to confirm this interpretation.

In contrast, higher agreement rates were reported for communication with immediate supervisors (approximately 82%) and for horizontal communication within organisational units (approximately 75%). These results indicate greater satisfaction with communication at closer hierarchical and peer levels.

## DISCUSSION

Healthcare organisations exhibit inherent hierarchical structures, with roles delineated by authority, expertise, and professional responsibility. University clinical centres function at the intersection of clinical care, medical education, and translational research, necessitating coordination across diverse domains.

Descriptive findings support sub-hypothesis 1.1, as the majority of participants indicated that work-related information is primarily obtained through formal communication channels, while also recognizing the importance of informal exchanges. This pattern demonstrates a dual communication structure: formal systems provide clarity and procedural stability, whereas informal interactions promote flexibility and responsiveness (Welch & Jackson, 2007). While formal communication ensures accountability and trace-

ability, it can also create structural barriers, particularly for upward communication (Sutcliffe et al., 2004; Creese et al., 2024). In contrast, informal communication enables rapid coordination and teamwork in dynamic clinical environments (O'Daniel & Rosenstein, 2008; Manser, 2009; Glenton et al., 2024), although the absence of formal documentation may introduce risks related to inconsistent messaging and patient safety (Wilson et al., 2024; Suh & Wyer, 2023). Thus, effective healthcare communication relies on the balanced integration of formal and informal mechanisms (Schneider et al., 2013).

Communication with immediate supervisors was evaluated more positively than communication with higher-level management (sub-hypothesis 1.2 vs sub-hypothesis 1.3). This pattern may reflect proximity effects commonly described in organisational literature, whereby communication is perceived more favourably at lower hierarchical levels. While hierarchical structures clarify roles and responsibilities, they may also limit the flow of bottom-up feedback (Essex et al., 2023). Organisational learning and internal communication practices have been linked to stronger organisational commitment in hospital settings (Tsai, 2014). Leadership development initiatives have also been associated with improved workforce engagement and satisfaction (Chang & Wang, 2023; Raj, 2020). Recent analyses of hospital leadership models further highlight the role of leadership competencies in supporting organisational performance (Zhao et al., 2024; Basterrechea et al., 2024).

Descriptive findings support sub-hypothesis 1.4, indicating that positive horizontal communication contributes to team cohesion and mutual support. Research on interprofessional teamwork demonstrates that team cohesion, shared goals, trust, and open communication are associated with a stronger safety culture and improved patient outcomes. Studies examining human factors and team interventions show that effective collaborative practices enhance both organisational and clinical performance in hospital settings (Aaberg, 2022; Aaberg et al., 2020; Epstein, 2014; Shirley et al., 2024). Positive peer-level communication appears to facilitate effective handovers and collaborative problem-solving within healthcare teams, as communication strategies emphasising information exchange and reflective debriefing have been linked to improved team coordination and collaborative practice (Kim et al., 2021; Stafford et al., 2021).

Sub-hypothesis 1.5 receives partial support, as approximately half of the respondents indicate frequent use of electronic communication as a primary internal channel. Email continues to serve as a foundational asynchronous communication tool within formal health information infrastructures (Car & Sheikh, 2004). Instant messaging platforms, including WhatsApp, are increasingly adopted for rapid clinical coordination. Nevertheless, issues related to privacy, governance, and data protection necessitate the establishment of clear institutional regulations and policy frameworks (Brunasso & Massone, 2020; Benedictis et al., 2021).

Electronic communication constitutes one element within a broader communication ecosystem, rather than serving as the sole determinant of effectiveness. Variations in system adoption and usability across organisational contexts and user groups underscore the necessity for structured implementation strategies and user-centred system design (Vest & Kash, 2016; Maloney et al., 2014; Fleurant et al., 2011; Carrington & Effken, 2011).

This study provides descriptive evidence supporting the association between communication climate and organisational belonging (sub-hypothesis 6 supported). Previous research on organisational climate indicates that employees' engagement with institutional initiatives may influence their alignment with organisational priorities (Rangel et al., 2024). Additionally, professional cultures that emphasize belonging and inclusiveness have been linked to equity-related outcomes in healthcare settings (Ridling et al., 2023). Therefore, communication climate constitutes a significant contextual factor influencing organisational identification and engagement.

Employees at the University Clinical Centre of the Republic of Srpska reported general satisfaction with internal communication, which provides descriptive support for Hypothesis 1. However, observed variation across communication dimensions indicates areas for further improvement, especially in upward communication, feedback mechanisms, and the formal governance of electronic communication tools.

## STRENGTHS AND LIMITATIONS

This study provides empirical evidence based on a substantial sample ( $N = 300$ ) across multiple organisational units and hierarchical levels within a tertiary healthcare institution. The multidimensional operationalisation of internal communication enabled structured assessment of vertical, horizontal, electronic, and climate-related dimensions. The use of composite scores and the Agreement Index enhanced analytical clarity and managerial applicability.

However, the cross-sectional and descriptive design limits causal interpretation. The single-centre setting reduces generalisability, and reliance on self-reported data introduces potential response bias. Further psychometric validation, including internal consistency testing, would strengthen measurement robustness. Future research should incorporate inferential analyses and multi-institutional samples to enhance theoretical and empirical contributions.

## CONCLUSION

This study provides a descriptive assessment of internal communication within a large tertiary healthcare institution. Findings indicate generally positive employee perceptions, particularly regarding communication with immediate supervisors and peers, which supports team cohesion and a favourable communication climate.

Lower evaluations of information availability at the institutional level and electronic communication usage suggest areas for organisational improvement. Differences observed across hierarchical levels point to the need for strengthening upward and cross-level communication mechanisms.

Overall, internal communication appears functionally established but would benefit from targeted managerial interventions aimed at improving transparency, feedback processes, and digital communication governance. Future research should incorporate multi-institutional designs and inferential analyses to further explore the relationship between communication practices and organisational outcomes.

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# IMPACT OF A PHARMACIST-LED MULTIDIMENSIONAL ADVISORY INTERVENTION ON CARDIOMETABOLIC OUTCOMES IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: A QUASI-EXPERIMENTAL STUDY

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**Abstract: Introduction:** Type 2 diabetes mellitus (T2DM) is a major public health challenge, particularly in settings where pharmacists remain primarily dispensing-oriented. This study evaluated the impact of a pharmacist-led multidimensional advisory intervention on cardiometabolic outcomes in patients with T2DM. **Methodology:** A quasi-experimental study with control and intervention groups was conducted in a community pharmacy in Bosnia and Herzegovina. Forty adult patients were allocated to usual care (n=20) or a four-month pharmacist-led programme including nutrition education, lifestyle counselling, physical activity, and continuous support (n=20). Body mass index (BMI), fasting blood glucose (FBG), and blood pressure were measured at baseline and follow-up, while HbA1c was assessed in the intervention group, limiting between-group comparisons. **Results:** Significant reductions in BMI (p=0.002), FBG (p=0.026), and HbA1c (p=0.001) were observed in the intervention group, whereas no significant improvements were detected in the control group. **Conclusion:** These findings provide preliminary evidence that pharmacist-led advisory interventions may improve metabolic control in patients with T2DM.

**Keywords:** Type 2 diabetes mellitus; community pharmacy; pharmacist-led intervention; lifestyle counselling; body mass index; fasting blood glucose; HbA1c; blood pressure; cardiometabolic risk; chronic disease management

## INTRODUCTION

Diabetes mellitus (DM) is one of the most significant chronic non-communicable diseases of the modern era, characterised by a continuously increasing prevalence and substantial public health, economic, and social consequences. According to estimates by the International Diabetes Federation, more than 415 million people worldwide are currently living with diabetes, with projections indicating an increase to approximately 642 million by 2040. Type 2 diabetes accounts for over 90% of all diagnosed cases (Farooqi et al., 2022).

The greatest burden of the disease affects the working-age population, while more than 80% of individuals with diabetes reside in low- and middle-income countries, where access to preventive and therapeutic interventions is often limited (Galicia-Garcia et al., 2020). These epidemiological trends clearly underscore diabetes mellitus as a major and growing challenge for contemporary health systems.

Diabetes mellitus is a chronic condition that requires lifelong treatment, regular monitoring, and sustained patient engagement. Effective management relies on an integrated approach combining pharmacotherapy, continuous medical care, and structured lifestyle modification interventions. Patient education plays a pivotal role in diabetes management by enhancing disease-related knowledge, self-management skills, and responsible health behaviours. Substantial evidence demonstrates that adequate patient education contributes to improved glycemic control, reduced risk of microvascular and macrovascular complications, and overall improvement in quality of life among individuals with diabetes (Ahmed et al., 2021; Khan et al., 2021). The burden of diabetes also extends to psychological and social domains of quality of



life, where emotional distress and social functioning are frequently impaired among patients with diabetes mellitus (Grujić-Vujmilović & Gavrić, 2014).

Modern diabetes management is founded on a multidisciplinary, patient-centred approach in which individuals with diabetes are actively involved in therapeutic decision-making and treatment implementation. Within this framework, pharmacists play an increasingly important role owing to their high accessibility, frequent patient contact, and expertise in pharmacotherapy. Globally, pharmacists rank as the third-largest group of health care professionals, following physicians and nurses (Ahmed et al., 2021; Khan et al., 2021).

In well-developed health care systems, pharmacists deliver comprehensive pharmaceutical care, encompassing patient counselling and education, support for medication adherence, and the identification and prevention of drug-related problems. Conversely, in many developing and transitional health systems, pharmacists' roles remain largely confined to medication dispensing, with limited involvement in chronic disease management, despite the growing prevalence and burden of diabetes mellitus (Ahmed et al., 2021; Khan et al., 2021).

As readily accessible health care providers, community pharmacists represent integral members of the multidisciplinary health care team involved in the management of type 2 diabetes mellitus (T2DM). Their accessibility within the community enables early identification of patients requiring additional medical evaluation and facilitates timely referral to appropriate healthcare providers (Hassan et al., 2023; Langhinrichsen-Rohling et al., 2023). Evidence suggests that pharmacist-led interventions and community pharmacy-based models are associated with improved glycaemic control and optimisation of pharmacotherapy, contributing to more individualised management of patients with type 2 diabetes (Jahangard-Rafsanjani et al., 2014; Sharp et al., 2017). Moreover, pharmacist-led medication therapy management and adherence-enhancing interventions have been associated with significant improvements in glycaemic control and broader clinical outcomes among individuals with type 2 diabetes (Taveira et al., 2010).

Pharmaceutical interventions in diabetes management encompass a broad spectrum of activities, including patient counselling on appropriate medication use, identification and prevention of adverse drug reactions and clinically relevant drug-drug interactions, and support for self-monitoring of blood glucose. In addition, pharmacists provide structured education on lifestyle modifications, such as healthy dietary practices, regular physical activity, weight management, and smoking cessation. Effective collaboration between pharmacists and other health care professionals is therefore essential, as a coordinated, multidisciplinary approach increases the likelihood of achieving and maintaining optimal glycemic control and contributes to a reduction in overall cardiometabolic risk (American Association of Diabetes Educators, 2019; Brewster et al., 2020; Cooney et al., 2022; Kent et al., 2013).

In Bosnia and Herzegovina, including the cantons of the Federation of Bosnia and Herzegovina, pharmacists currently have a limited role in the management of diabetes mellitus. The majority of pharmacists are employed in community pharmacies, health care institutions, or pharmaceutical companies, where their professional activities are predominantly focused on medication dispensing and the provision of basic therapeutic information. This practice indicates a substantial underutilization of pharmacists' potential in chronic disease management.

Given the growing body of evidence demonstrating the positive effects of pharmacist-led interventions on glycaemic control, treatment adherence, and health-related quality of life, further development and rigorous evaluation of care models in which pharmacists assume an expanded advisory and educational role within primary care settings appear warranted (Ali et al., 2012; Antoine et al., 2014; Dwiputri et al., 2020; Krass & Hoti, 2019). Such models may be particularly relevant in health systems facing an increasing burden of type 2 diabetes mellitus (T2DM).

The present study aims to assess the impact of pharmacist-led advisory interventions on health outcomes in patients with T2DM, with a specific focus on lifestyle-related counselling targeting dietary habits

and physical activity.

Accordingly, the study objectives and hypotheses are defined as follows:

Does the pharmacist-led advisory interventions influence body mass index (BMI) in patients with T2DM?

*Hypothesis 1:* Pharmacist-led advisory interventions are associated with a statistically significant change in BMI among patients with T2DM.

Does the pharmacist's advisory intervention impact blood pressure regulation in patients with T2DM?

*Hypothesis 2:* Pharmacist-led advisory interventions result in statistically significant changes in systolic and diastolic blood pressure values among patients with T2DM.

Does the pharmacist's advisory intervention impact glycemic regulation in patients with T2DM?

*Hypothesis 3:* Pharmacist-led advisory interventions are associated with statistically significant changes in glycemic values among patients with T2DM.

## METHODOLOGY

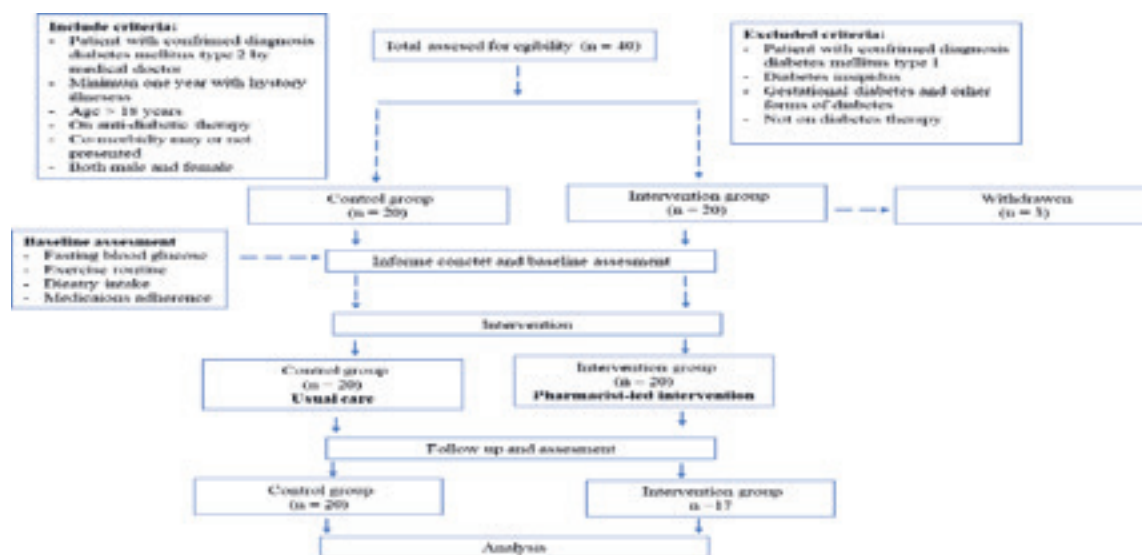
### RESEARCH DESIGN

This study employed a quasi-experimental, prospective cohort design with control and intervention groups. It was conducted between November 2022 and April 2023 at the Public Health Institution City Pharmacy Cazin.

Baseline anthropometric, clinical, lifestyle, and treatment-related characteristics were collected for both groups prior to the intervention to assess comparability between groups. Continuous variables were expressed as mean  $\pm$  standard deviation or median with interquartile range, as appropriate, while categorical variables were presented as number and percentage. Between-group comparisons at baseline were performed using the independent-samples t-test or Mann-Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. These variables were included for descriptive purposes only and were not considered outcome measures.

### STUDY PARTICIPANTS

Adults of both sexes aged 18 years or older with a confirmed diagnosis of type 2 diabetes mellitus were included in the study. The diagnosis was established by a specialist in internal medicine or a subspecialist in endocrinology.



**Figure 1.** Flow diagram of participant recruitment, allocation, and analysis

Source: Authors

At baseline, the study sample consisted of 40 participants, who were allocated to two groups:

- control group (n = 20), comprising patients who received usual health care without additional pharmaceutical intervention, and
- intervention group (n = 20), comprising patients who, in addition to usual health care, participated in a four-month pharmacist-led education and counselling programme.

Participants were allocated to the control and intervention groups using a non-random, convenience-based sequential assignment, reflecting the real-world setting of community pharmacy practice.

During the study period, three participants from the intervention group withdrew; therefore, the final analysis included 17 participants in the intervention group and 20 participants in the control group (Figure 1).

### INCLUSION AND EXCLUSION CRITERIA

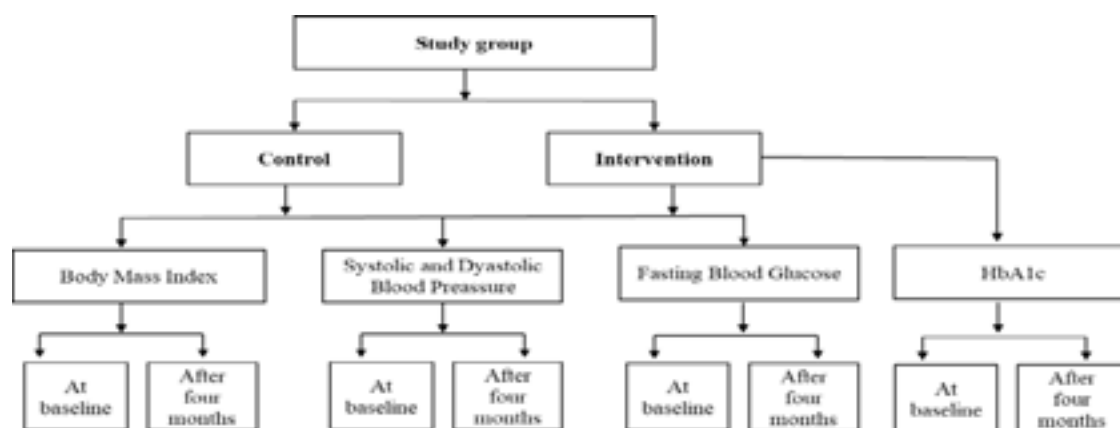
Inclusion criteria were: adults aged  $\geq 18$  years with a confirmed diagnosis of type 2 diabetes mellitus, receiving pharmacological treatment, and able to participate in counselling sessions. Exclusion criteria included pregnancy, severe comorbid conditions, inability to participate in follow-up, and patients not receiving diabetes therapy.

### PHARMACEUTICAL INTERVENTION PROGRAM

The pharmaceutical intervention program was implemented over a four-month period and consisted of structured educational and counselling activities. The intervention included:

- educational lectures on appropriate nutrition for diabetes management,
- workshops focused on healthy lifestyle modification,
- organised physical activity, comprising a total of 6 kilometres of walking during the intervention period,
- continuous online communication via a Viber group,
- individual face-to-face consultations with a pharmacist at the pharmacy.

### DATA COLLECTION AND MEASUREMENT



**Figure 2.** Process of data collection in the control and intervention groups

Source: Authors

Data were collected at two time points: at the beginning of the study (baseline measurement) and after four months. The following variables were measured in both groups (Figure 2):

- body mass index (BMI),
- systolic and diastolic blood pressure
- fasting blood glucose.

Due to logistical and financial constraints, HbA1c was measured only in the intervention group, which limits direct comparison of long-term glycaemic control between groups.

### MEASUREMENT OF ANTHROPOMETRIC AND CLINICAL PARAMETERS

Anthropometric and clinical parameters were assessed at baseline and at the end of the study. Body mass index (BMI) was determined for all participants and calculated using the following formula:

$$\text{Body mass index (BMI)} = \frac{\text{Body mass (kg)}}{\text{Body height (m)}^2} \quad (1)$$

Body height and mass were measured using standardised anthropometric procedures.

Arterial blood pressure (systolic and diastolic) was measured on the left arm using the standard Korotkov auscultatory method after at least 5 minutes of rest in a seated position. Blood pressure values were expressed in millimetres of mercury (mmHg).

### BIOCHEMICAL ANALYSES

Blood samples were collected in the early morning after an overnight fast. Fasting blood glucose levels were measured from capillary blood using an Accu-Chek Active glucometer (Roche Diagnostics, Mannheim, Germany) and expressed in millimoles per litre (mmol/L).

Glycosylated haemoglobin (HbA1c) levels were measured exclusively in the intervention group using the Quo-Lab HbA1c analyser (EKF Diagnostics, Cardiff, UK). HbA1c values were expressed as percentages (%) and in millimoles per mole (mmol/mol), in accordance with International Federation of Clinical Chemistry (IFCC) recommendations.

### STATISTICAL DATA PROCESSING

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY, USA). Continuous variables are presented as mean  $\pm$  standard deviation for normally distributed data or as median with interquartile range (IQR; 25th–75th percentile) for non-normally distributed data. Categorical variables are presented as absolute and relative frequencies.

The normality of data distribution was assessed using the Shapiro–Wilk test. Comparisons of continuous variables before and after the intervention were performed using the paired Student's *t*-test or the Wilcoxon signed-rank test, as appropriate. Differences between groups were analysed using the independent-samples Student's *t*-test or the Mann–Whitney *U* test, depending on data distribution. Categorical variables were compared using the chi-square test or Fisher's exact test, when applicable.

All statistical tests were two-tailed, and statistical significance was set at  $p < .05$ .

Due to the nature of the intervention, blinding of participants and providers was not feasible; however, outcome measurements followed standardised procedures to minimise bias.

## RESULTS

Table 1 presents the sociodemographic and clinical characteristics of the participants. No statistically significant differences were observed between the control and intervention groups regarding gender ( $p = .549$ ), educational level ( $p = .128$ ), employment status ( $p = .250$ ), or place of residence ( $p = 1.000$ ).

**Table 1.** Baseline sociodemographic characteristics of participants in the control and intervention groups

| Variable                      |                                       | Group          |                     | p-value |
|-------------------------------|---------------------------------------|----------------|---------------------|---------|
|                               |                                       | Control (n=20) | Intervention (n=17) |         |
|                               |                                       | N (%)          | N (%)               |         |
| <b>Gender</b>                 | Male                                  | 9 (45.0)       | 6 (35.3)            | .549    |
|                               | Female                                | 11 (55.0)      | 11 (64.7)           |         |
| <b>Educational attainment</b> | Lower education                       | 10 (50.0)      | 5 (29.4)            | .128    |
|                               | Secondary education                   | 10 (50.0)      | 8 (47.1)            |         |
|                               | Higher education (college/university) | 0 (0.0)        | 4 (23.6)            |         |
| <b>Employment status</b>      | Employed                              | 7 (35.0)       | 2 (11.8)            | .250    |
|                               | Unemployed                            | 5 (25.0)       | 5 (29.4)            |         |
|                               | Retired                               | 8 (40.0)       | 10 (58.8)           |         |
| <b>Place of residence</b>     | Urban                                 | 11 (55.0)      | 9 (52.9)            | 1.000   |
|                               | Rural                                 | 9 (45.0)       | 8 (47.1)            |         |

**Source:** Authors

**Note:** Values are presented as n (%) unless otherwise indicated. Between-group categorical variables were compared using the chi-square test or Fisher's exact test, and between-group continuous variables using the independent-samples t test or Mann–Whitney U test. M = mean; SD = standard deviation; p-value refers to the comparison before and after the intervention (paired analysis).

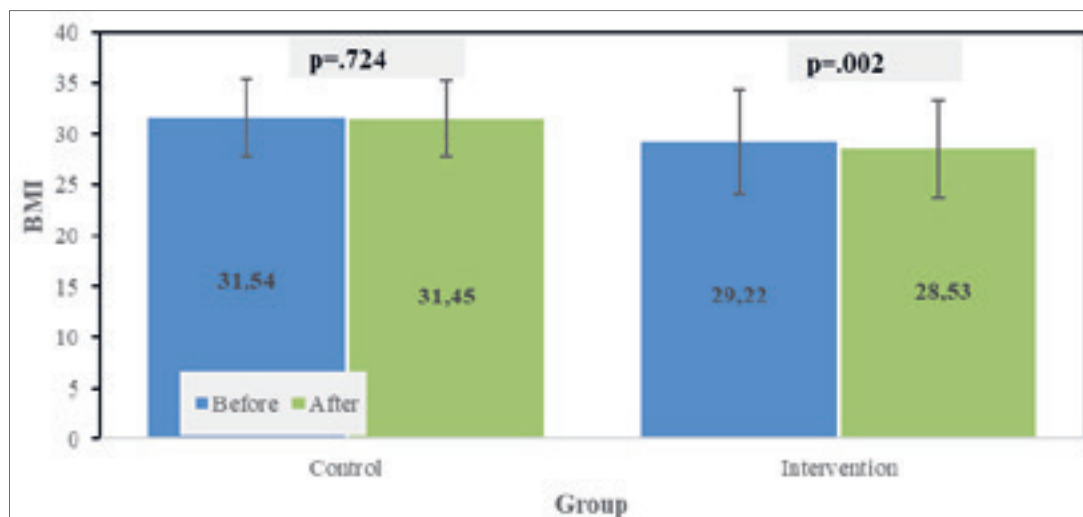
**Table 2.** Baseline clinical characteristics of participants in the control and intervention groups

| Variable                                                         |                                   | Group              |                     | p-value |
|------------------------------------------------------------------|-----------------------------------|--------------------|---------------------|---------|
|                                                                  |                                   | Control (n=20)     | Intervention (n=17) |         |
|                                                                  |                                   | N (%)              | N (%)               |         |
| <b>Body weight (kg), M ± SD</b>                                  |                                   | 88.2 ± 10.26       | 86.76 ± 4.52        | .765    |
| <b>Body height (cm), M ± SD</b>                                  |                                   | 167.30 ± 7.32      | 170.76 ± 8.62       | .195    |
| <b>Fasting Blood Glucose at Diagnosis (mmol/L), median (IQR)</b> |                                   | 10.0<br>(8.0–19.0) | 15.0<br>(7.9–19.75) | .869    |
| <b>Physically active (more than 30 minutes daily)</b>            |                                   | 17 (85.0)          | 14 (82.4)           | .587    |
| <b>Meals per day, median (IQR)</b>                               |                                   | 3 (3.0–4.0)        | 4 (4.0–4.75)        | .060    |
| <b>Special diet adherence</b>                                    |                                   | 8 (40.0)           | 9 (52.9)            | .430    |
| <b>Treatment modality</b>                                        | Oral antidiabetic drugs           | 11 (55.0)          | 4 (23.5)            | .071    |
|                                                                  | Oral antidiabetic drugs + insulin | 6 (30.0)           | 10 (58.5)           |         |
|                                                                  | Insulin therapy                   | 3 (15.0)           | 3 (17.6)            |         |

**Source:** Authors

**Note:** Values are presented as n (%) unless otherwise indicated. Between-group categorical variables were compared using the chi-square test or Fisher's exact test, and between-group continuous variables using the independent-samples t test or Mann–Whitney U test. M = mean; SD = standard deviation; IQR = interquartile range; p-value refers to the comparison before and after the intervention (paired analysis).

The mean body mass index (BMI) in the control group was  $31.54 \pm 3.75$  at baseline and did not change significantly after four months ( $31.45 \pm 3.70$ ;  $p = .724$ ). In the intervention group, the mean BMI decreased from  $29.22 \pm 5.05$  at baseline to  $28.53 \pm 4.80$  four months after the intervention, and this change was statistically significant ( $p = .002$ ) (Figure 3).



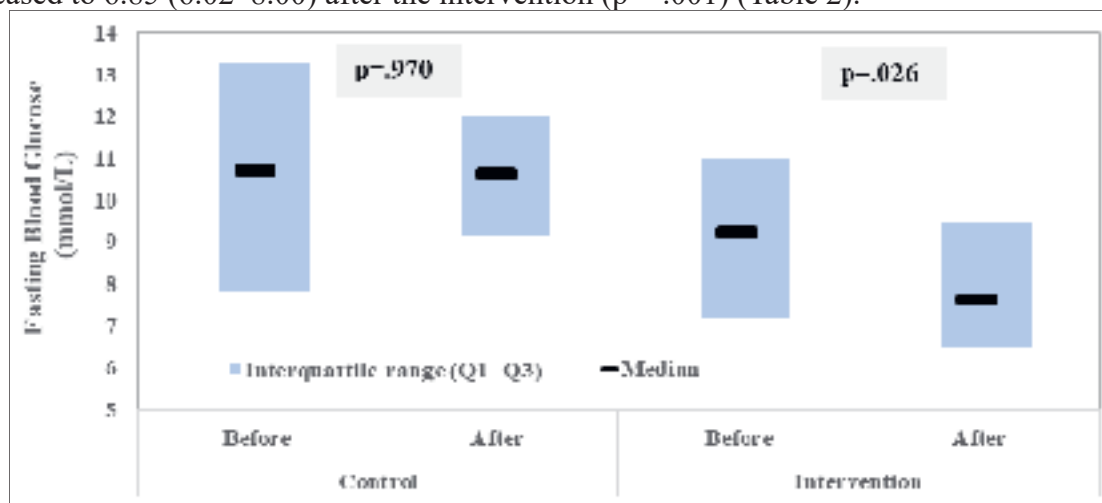
**Figure 3.** Mean fasting body mass index (BMI) in the control and intervention groups before and after the intervention (n = 20 (control), n = 17 (intervention))

**Source:** Authors

**Note:** Results are presented as mean  $\pm$  standard deviation ( $M \pm SD$ ); p-value refers to the comparison before and after the intervention (paired t-test / Wilcoxon signed-rank test)

The control group's median fasting blood glucose at baseline was 10.70 (7.85–13.30) and did not change significantly after four months, when it was 10.60 (9.15–12.02) ( $p = .970$ ). In contrast, the intervention group's median fasting blood glucose decreased significantly from 9.20 (7.20–10.95) before the intervention to 7.60 (6.50–9.50) after the intervention ( $p = .026$ ) (Figure 4).

The median HbA1c value in the intervention group was 7.85 (6.45–9.37) before the intervention and decreased to 6.85 (6.02–8.00) after the intervention ( $p = .001$ ) (Table 2).



**Figure 4.** Median fasting blood glucose values in the control and intervention groups before and after the intervention

**Source:** Authors

**Note:** Data are presented as median with interquartile range (25th–75th percentiles); p-value refers to the comparison before and after the intervention (paired t-test / Wilcoxon signed-rank test)

In the control group, median systolic blood pressure increased from 138.35 (125.50–155.75) at baseline to 150.0 (140.0–160.0) after four months ( $p = .005$ ), whereas no change was observed in the intervention group [140.0 (122.5–160.0) vs. 140.0 (136.0–162.5);  $p = .523$ ] (Figure 5, Panel A).



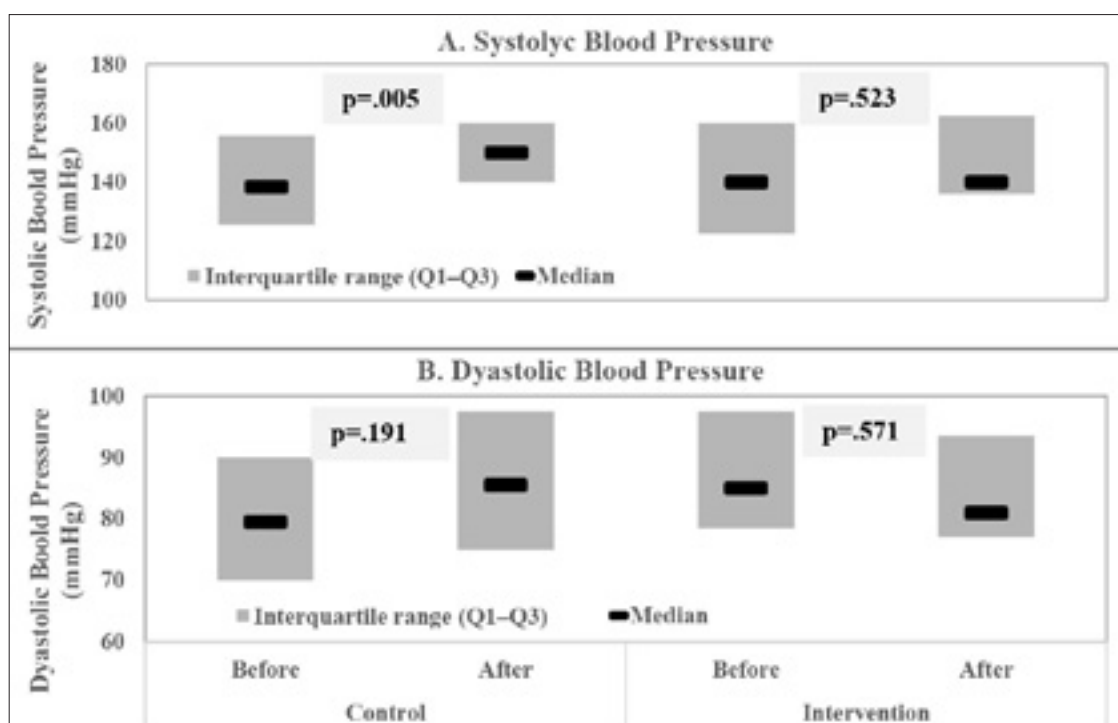
**Table 3.** Median (interquartile range) HbA1c values in the intervention group before and after the intervention

| Time point          | HbA1c Medina (%) | Interquartile range (25th–75th) | p-value |
|---------------------|------------------|---------------------------------|---------|
| Before intervention | 7.85             | 6.45–9.37                       | .001    |
| After intervention  | 6.85             | 6.02–8.00                       |         |

**Source:** Authors

**Note:** Data are presented as median with interquartile range (25th–75th percentiles); p-value refers to the comparison before and after the intervention (paired analysis).

Median diastolic blood pressure showed no significant changes in either group over time. In the control group, values increased from 79.50 (70.0–90.0) to 85.50 (75.0–97.50) ( $p = .191$ ), while in the intervention group values decreased from 85.0 (78.50–97.50) to 81.0 (77.0–93.5) ( $p = .571$ ) (Figure 5, Panel B).

**Figure 5.** Changes in systolic and diastolic blood pressure in the control and intervention groups over time

**Source:** Authors

**Note:** Panel A shows systolic blood pressure, and Panel B shows diastolic blood pressure in the control and intervention groups before and after the intervention. Data are presented as median and interquartile range (25th–75th percentiles). p-values refer to within-group comparisons over time.

## DISCUSSION

Diabetes mellitus is a chronic metabolic disease that presents a growing global burden and has significant consequences for morbidity, mortality, and quality of life. Effective diabetes management requires a combination of pharmacological and non-pharmacological strategies, with education and self-care support serving as essential components of long-term disease control. Pharmacists, given their accessibility, frequent patient interactions, and expertise in pharmacotherapy, are well-positioned to deliver advisory and educational interventions. Pharmaceutical interventions have been shown to improve multiple clinical outcomes in individuals with diabetes, including glycaemic control, body mass index, lipid profile, and

blood pressure, and to enhance medication adherence and health-related quality of life (Ali et al., 2012; Antoine et al., 2014; Pousinho et al., 2016). Evidence suggests that pharmacist-led interventions are associated with measurable improvements in body mass index and glycaemic control, including reductions in HbA1c, alongside improvements in other cardiometabolic parameters (Ali et al., 2012; Antoine et al., 2014; Pousinho et al., 2016). Previous regional research has shown that diabetes mellitus significantly affects both psychological and social aspects of quality of life, further emphasising the importance of comprehensive patient support models (Grujić-Vujmilović & Gavrić, 2014).

The pharmacists' advisory roles in real-world settings may represent an effective model of patient support, particularly in health systems where pharmacists' involvement in chronic disease management remains underutilised.

In our study, the pharmacist-led intervention consists of nutrition counselling, education and recommending appropriate physical activity.

Our interventions are associated with statistically significant changes in body mass index (BMI) among patients with type 2 diabetes mellitus (T2DM) (H1 accepted). Systematic reviews and meta-analyses have demonstrated that pharmacist-led interventions are associated with significant reductions in HbA1c and improvements in other cardiometabolic parameters, including body mass index (Aguiar et al., 2016; Pousinho et al., 2016). In addition, pharmacists frequently collaborate with other healthcare professionals within multidisciplinary teams. Evidence suggests that coordinated, team-based care models involving pharmacists are associated with improved metabolic and cardiovascular outcomes, indicating that integrated care approaches may enhance intervention effectiveness (Carter et al., 2015; Pousinho et al., 2016). Furthermore, studies have shown that ongoing monitoring and regular touchpoints with pharmacists have been associated with significant improvements in BMI and diabetes-related outcomes (Pousinho et al., 2016; Aguiar et al., 2016).

Hypothesis 2 is partially supported in our findings: the mean systolic blood pressure in the intervention group remains at 140 mmHg, while the mean diastolic blood pressure decreases from 85 to 81 mmHg. These findings indicate that, following the intervention, most patients in the intervention group exhibited systolic and diastolic blood pressure values approaching recommended targets; the observed reduction in diastolic blood pressure is consistent with evidence demonstrating that pharmacist-led interventions contribute to improved blood pressure control within team-based care models (Carter et al., 2009; Santschi et al., 2014). According to contemporary international guidelines, blood pressure targets for patients with diabetes mellitus should be individualised. For most adults, a target of <130/80 mmHg is recommended when it can be safely achieved, whereas less stringent targets (<140/90 mmHg) may be appropriate for older individuals or those with multiple comorbidities (American Diabetes Association, 2024; McEvoy et al., 2024; Williams et al., 2018; World Health Organization, 2021). In evaluating the efficacy of pharmacist-led programs, systematic reviews and randomised controlled trials have reported significant reductions in systolic and diastolic blood pressure, alongside improvements in patient-reported outcomes, including satisfaction and health-related quality of life (Ali et al., 2012; Antoine et al., 2014; Pousinho et al., 2016).

Fasting blood glucose (FBG) is used to assess glycaemic control, and HbA1c levels reflect the average blood glucose concentrations over the past two to three months in patients with T2DM. The intervention was associated with statistically significant changes in fasting blood glucose (FBG) among patients with type 2 diabetes mellitus (T2DM) in the intervention group (H3 accepted).

The literature indicates that diverse interventions, including structured lifestyle modification programmes and pharmacist-led coordinated care models, are associated with statistically significant reductions in fasting blood glucose among patients with type 2 diabetes mellitus (Gong et al., 2021; Langhinrich-

sen-Rohling et al., 2023; Azmiardi et al., 2021). Additionally, a significant change in HbA1c, an indicator of average glycemia, is observed in the intervention group in the early weeks and months (before intervention 7,85 [6,45–9,37] vs after intervention 6,85 [6,02–8,00];  $p=0.001$ ). These findings are clinically relevant because a moderate, as even moderate reduction in HbA1c is associated with a lower risk of diabetic complications and a better health-related quality of life. Multiple studies corroborate that even modest decreases in HbA1c can lead to significant improvements in health outcomes. A 1% reduction in HbA1c has been associated with a 37% decrease in the risk of microvascular complications and a 14% reduction in myocardial infarction risk, underscoring the critical importance of glycaemic control in diabetes management (Stratton et al., 2000). Furthermore, achieving target HbA1c levels can positively influence health-related quality of life (HRQoL), as evidenced by studies linking better glycaemic control with improved patient outcomes and psychosocial well-being (Azmiardi et al., 2021; Sindhu & Jayakumar, 2023). From a public health perspective, integrating pharmacist-led advisory services into chronic disease management may be a cost-effective, scalable strategy to enhance patient-centred diabetes care. Evidence from structured prevention programmes has demonstrated favourable clinical and economic outcomes, particularly among high-risk populations (Grujić-Vujmilović et al., 2025; World Health Organization, 2021).

### STRENGTHS AND LIMITATIONS

This study has several important strengths. Conducting the research in a real-world community pharmacy setting enhances ecological validity and practical relevance, as the findings reflect routine clinical practice rather than controlled experimental conditions. This is consistent with evidence supporting community pharmacy-based models in chronic disease management, particularly diabetes, through expanded pharmacist roles within structured service frameworks (Hassan et al., 2023; Teoh et al., 2024). The multidimensional intervention—integrating structured education, individual counselling, organised physical activity, and digital communication—reflects comprehensive chronic care principles. Similar integrated approaches have been associated with improvements in BMI, glycaemic control, and self-management capacity among patients with type 2 diabetes mellitus (Aguiar et al., 2016; Azmiardi et al., 2021; Pousinho et al., 2016).

The inclusion of a control group strengthened comparative analysis, and clinically meaningful outcomes—including BMI, fasting blood glucose, blood pressure, and HbA1c—were assessed in line with internationally recognised diabetes and cardiovascular risk control targets (American Diabetes Association, 2024; McEvoy et al., 2024; Stratton et al., 2000). Importantly, the study provides context-specific evidence from Bosnia and Herzegovina, where pharmacist-led chronic disease management services remain underdeveloped within primary care structures.

However, several limitations should be acknowledged. The quasi-experimental design without randomisation restricts causal inference and does not exclude residual confounding. The relatively small sample size reduces statistical power and limits generalisability. A four-month follow-up may not adequately capture the long-term sustainability of behavioural and metabolic improvements. Furthermore, HbA1c was assessed only in the intervention group, limiting between-group comparison of long-term glycaemic control. This limitation should be considered when interpreting the magnitude of the intervention effect on long-term glycaemic control.

The potential influence of the Hawthorne effect and the single-site design may further affect external validity. Accordingly, the findings should be interpreted as preliminary evidence from a pilot exploratory study rather than a definitive efficacy trial.

From a health system perspective, these findings support the integration of pharmacist-led advisory ser-

vices into primary healthcare in Bosnia and Herzegovina. Expanding the role of community pharmacists through structured chronic disease management programmes may contribute to improved access to care, reduced burden on physicians, and more efficient utilisation of healthcare resources. Such task-shifting approaches align with ongoing health system strengthening and primary care reform initiatives in transitional settings.

## CONCLUSION

Pharmacist-led advisory interventions delivered in a community pharmacy setting were associated with improvements in key cardiometabolic parameters among patients with type 2 diabetes mellitus. Reductions in BMI, fasting blood glucose, and HbA1c, alongside stabilised blood pressure values, suggest that structured lifestyle-oriented counselling and ongoing support may enhance metabolic control.

Although larger randomised studies with extended follow-up are required to confirm long-term sustainability and broader applicability, these findings provide preliminary support for expanding the role of community pharmacists in chronic disease management. Integrating pharmacist-led services into primary care may represent a feasible and scalable strategy for strengthening patient-centred diabetes management and optimising health system resource utilisation.

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# REDUCING MARKET MARGINALIZATION OF PEOPLE WITH DISABILITIES: CHALLENGES AND THE NEED FOR INCLUSIVE MARKETING

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**Abstract:** The paper explores the role of an inclusive approach in reducing the market marginalization of people with disabilities, with the aim of examining how specific characteristics of the population affect their market inclusion. The research is based on the analysis of secondary data from the 2013 Census of Population in the Republic of Srpska. Year. The data were used to identify the dominant segments of the population and their specific needs, which is the basis for considering an inclusive approach to the market. Using descriptive statistics, absolute and relative proportions of individual types of disability were determined, while the  $\chi^2$  independence test was used to examine statistically significant differences in the distribution of disability by sex and age groups. The results show that men are more often represented in the categories of difficulties in moving and climbing stairs, while women are relatively more represented in the categories of difficulties in independent care and communication. An analysis of age groups and visual impairments shows that younger groups have a high relative incidence of vision problems, suggesting congenital or early forms, while older groups record a higher absolute number of people with visual difficulties, reflecting age-related degenerative changes. These findings confirm the heterogeneity of the population of persons with disabilities and highlight the existence of segments with different needs that require a differentiated approach in planning the accessibility of products, services and information. A mismatch between identified needs and the general availability of market resources can limit the market involvement of these individuals, while the implementation of an inclusive approach allows for better designed policies and strategies. The paper contributes to the theory of market segmentation by integrating demographic data and the principles of inclusion, while providing practical guidelines for improving physical and digital accessibility, creating targeted communication and developing socially responsible initiatives.

**Keywords:** inclusive marketing, people with disabilities, market inclusion, customized marketing strategies, market segmentation

**JEL classification:** M31, M14, J16, I38, L20

## INTRODUCTION

The modern market environment is characterized by an increasing need to adapt products, services and communication strategies to different segments of consumers. In this context, inclusive marketing is of particular importance because it develops approaches aimed at involving all social groups in market flows. According to Rivera et al. (2020, cited in ), Inclusive marketing represents “a type of integrated marketing approach that is human-centered and guided by the principles of shared values, but also recognizes the value of diversity and development for all.”

One of the most often neglected, but at the same time important segments are people with disabilities, whose needs are often not adequately recognized within the general approaches to market communica-



tion and the availability of products and services. According to available statistics, persons with disabilities in Republika Srpska make up a significant part of the total population, with their structure differing depending on the type of disability and demographic characteristics, including gender and age. This heterogeneity requires the application of the principles of market segmentation in order to identify specific segments and develop appropriate strategies to suit their needs. In practice, there is often a lack of recognition of these needs, which can lead to limited market involvement and reduced availability of products, services and information for these groups.

The problem of the research is reflected in the insufficiently researched relationship between the characteristics of the population of persons with disabilities and their market inclusion, as well as in the challenge of how to apply the principle of inclusivity in planning access to products, services and communication. Although the theoretical framework points to the importance of inclusion and a differentiated approach, empirical research linking demographic structure to potential implications for market inclusion is relatively rare, especially at the regional level.

The aim of this paper is to examine, based on the analysis of statistical data on the structure of disability in the Republic of Srpska, to what extent different segments of the population of persons with disabilities have specific needs that can affect their market inclusion. Accordingly, it has been hypothesized that insufficient recognition and adaptation of market access to these groups may significantly limit their economically and socially active participation.

## REVIEW OF PREVIOUS RESEARCH

In the last few years, the interest of researchers in the issues of inclusion in marketing has grown significantly, especially in the context of socially responsible practices and segmentation of vulnerable populations. The research focused on both theoretical concepts of inclusive marketing and empirical studies in various industries.

One of the most recent contributions in the field of inclusive marketing is the analysis of Celestino et al. (2024), who, through a systematic review of the literature, identified a trend of growing interest in disability and marketing topics, as well as a deficit of research linking demographic data to marketing practices. The authors point out that most of the existing papers remain fragmented and that a deeper quantitative analysis of the structure of market segments is needed.

The issue of the representation of people with disabilities is specifically addressed in the work of Lee et al. (2024), who explore the impact of symbolic representations in luxury fashion marketing on consumer perception. Their results show that an authentic and credible inclusive presentation significantly improves consumer engagement, but warns of possible negative effects if the presentations are stereotyped. Such findings confirm the need for careful design of inclusive campaigns.

The second line of research focuses on creating value through inclusive marketing strategies. Masiello and his associates. analyze this topic in the toy industry, showing that inclusivity, not only contributes to social responsibility, but also increases the competitive advantage of organizations. Similar claims are made by Tuli et al. (2025), who in their review point to inclusive marketing as a strategic instrument for the long-term development of brands.

Empirical research on digital accessibility suggests that inclusive digital marketing can improve access to information and economic opportunities for people with disabilities. Poulsen and Umar (2025) stress that digital platforms must be designed with accessibility as a priority in order to achieve social and market inclusion. Qayyum and Associates. (2023) They point out that inclusive advertising on platforms such as Instagram has a positive impact on brand perception and emotional well-being of the audience.

Several authors identify inclusive marketing as an important component of corporate social responsibility and associate it with corporate social responsibility programs. According to the American Marketing Association, Integrating inclusive approaches into CSR strategies can improve the reputation of organizations and empower consumers. Similarly, Nielsen (2024) points to its role in building consumer trust through authenticity and diversity in its reports on inclusive marketing.

In recent years, there has been increasing attention to the digital aspects of inclusive marketing, as well as the effect that accessible communication channels have on the market inclusion of marginalized groups. García de la Fuente et al. (2026) point to the importance of including the perspective of people with disabilities in the strategic design of socially responsible campaigns, and integrating their preferences into the development of marketing messages. This approach further emphasizes the multidimensional nature of inclusive marketing that is not only promotional but also participatory.

In the digital environment, research by Sewak et al. (2026) shows that the inclusion of visible people with disabilities in online brand campaigns, not only increases the perception of authenticity, but also directly affects consumer engagement and conversions. These findings are supported by a study by Södergren and Vallström, which analyses in detail digital marketing and innovative accessibility approaches for people with disabilities, highlighting that accessible websites and social networks contribute to wider market impact.

Although there are a number of studies highlighting the positive effects of inclusive marketing on consumer perceptions and market inclusion, many of them focus on specific industries or digital campaigns, leaving a gap in empirical analyses that link the demographic characteristics of disability and specific marketing outcomes at the macro level, which is exactly what this paper addresses.

## METHODOLOGY

The research is based on the analysis of data on the population in the Republic of Srpska from 2013, where the focus is placed on a tabular presentation of the distribution of persons with disabilities by type of difficulties, age groups and gender structure. The data have an aggregated character and were used in order to identify the dominant segments within the observed population, which is the basis for considering their market involvement and specific needs.

In methodological terms, the research combines quantitative and interpretive approaches. First of all, descriptive statistical analysis was applied, which determined absolute and relative indicators of the representation of individual categories of disability by gender and age groups. In this way, it is possible to identify the structure of the population and identify the segments with the greatest potential, in accordance with the theoretical assumptions of market segmentation.

To examine the differences between the observed categories, the  $\chi^2$  (chi-squared) independence test was used, which analyzed the relationship between:

1. Gender and type of disability.
2. age groups and visual impairments.

This test made it possible to determine the existence of statistically significant differences in the distribution of disabilities, which confirms the heterogeneity of the population and has direct implications for a differentiated approach in planning the availability of products, services and information.

In addition, a comparative share analysis was used to assess the intensity of differences between segments, while an inductive-deductive method was used to interpret the relationship between disability structure and potential market involvement. Based on the identified dominant categories of disabilities, their specific needs in the context of the availability of communications and services were analyzed, which enables the empirical application of the principles of inclusive market access.

Testing of the main hypothesis was carried out indirectly, through the connection of empirical findings with the theoretical framework of inclusive marketing. The results of the descriptive and comparative analysis, with the confirmation of statistically significant differences by  $\chi^2$  test by sex and age groups, indicate a pronounced heterogeneity of the observed population and the existence of segments with specific needs.

The combination of statistical methods (descriptive analysis and  $\chi^2$  test) and theoretical interpretation made it possible to confirm the research hypothesis that segmentation of the population by type of disability, sex and age group provides important guidelines for the development of an inclusive approach, which can contribute to increasing market inclusion and accessibility of services for these groups.

## RESULTS

Analyzing the data from the 2013 Census in Republika Srpska, the total number of inhabitants was 1,228,423, of which 600,306 were men and 628,117 women. The total number of persons with disabilities was 104,454, which represents approximately 8.5% of the total population of the Republic of Srpska. The population of people with disabilities is not homogeneous, but shows significant structural diversity. In order to identify the key segments, a descriptive statistical analysis was performed by types of difficulties and age groups (Table 1).

**Table 1.** Structure of persons with disabilities by type of disability and age groups in the Republic of Srpska, 2013 Age

| Age            | Total   | Vision | Hearing | Walking or climbing stairs | Memory and concentration | Dressing and maintaining personal hygiene | Communication | Multiple difficulties |
|----------------|---------|--------|---------|----------------------------|--------------------------|-------------------------------------------|---------------|-----------------------|
| Total          | 104,454 | 18,926 | 8,315   | 33,915                     | 2,831                    | 542                                       | 868           | 39,057                |
| Under 15 years | 1,225   | 285    | 89      | 169                        | 59                       | 42                                        | 93            | 488                   |
| 15-19          | 814     | 228    | 66      | 125                        | 28                       | 5                                         | 41            | 321                   |
| 20-29          | 1,786   | 485    | 116     | 352                        | 107                      | 16                                        | 69            | 641                   |
| 30-49          | 11,406  | 2,254  | 799     | 4,364                      | 621                      | 104                                       | 213           | 3,051                 |
| 50-59          | 18,384  | 4,271  | 1,160   | 6,930                      | 616                      | 109                                       | 150           | 5,148                 |
| 60-64          | 12,612  | 2,730  | 898     | 4,704                      | 317                      | 30                                        | 85            | 3,848                 |
| 65 and above   | 58,227  | 8,673  | 5,187   | 17,271                     | 1,083                    | 236                                       | 217           | 25,560                |

**Source:** Agency for Statistics of Bosnia and Herzegovina, 2018

The results show that the largest share is made up of people with mobility difficulties (33%), followed by people with visual difficulties (22%) and hearing difficulties (16%). Smaller segments include communication difficulties, self-care, and other types of disabilities. This distribution suggests that dominant segments of the population have a pronounced need for physical and communicative accessibility.

These findings form the basis for the application of the principle of market segmentation, as different types of disabilities require differentiated approaches. For example, people with visual and hearing impairments require adapted communication channels, while people with mobility impairments need the availability of physical locations and transportation options.

The analysis of the age structure of persons with disabilities shows a clear correlation between age and types of difficulties. In younger age groups, disability occurs less frequently, and vision and hearing

problems, often congenital or arising in early childhood, are dominant. The needs of this population are directed towards educational and developmental-rehabilitation programs, as well as towards the use of assistive technologies that enable inclusion in the educational process and social interaction.

As the population ages, the proportion of people with disabilities increases, and additional difficulties appear, including problems with memory, concentration and multiple impairments. In working age, these people face challenges related to employment, social integration and the preservation of independence, which requires access to adapted working and living conditions.

In older age groups, the number of people with disabilities is significantly higher, and difficulties of movement, vision, hearing and combined difficulties dominate. Priorities are then redirected towards preserving mobility, autonomy and quality health care, as well as adapting the residential and urban environment.

This distribution confirms that disability does not manifest uniformly throughout the life span, and that the planning of policies, services and strategies should be differentiated according to age groups, as each group has specific needs and expectations. Such an approach allows for precise targeting of resources and the development of effective support programs for the entire population of persons with disabilities.

In order to analyze the heterogeneity of the population of people with disabilities in more detail, a comparative analysis by gender was performed. The aim was to determine whether there are significant differences in the representation of different types of disabilities among men and women, which have direct implications for the adaptation of marketing strategies.

**Table 2.** Distribution by sex and type of disability in the Republic of Srpska, 2013

| Age   | Total   | Visual | Hearing | Walking or climbing stairs | Memory and concentration | Dressing and maintaining personal hygiene | Communication | Multiple difficulties |
|-------|---------|--------|---------|----------------------------|--------------------------|-------------------------------------------|---------------|-----------------------|
| Man   | 47,844  | 8,583  | 4,989   | 15,285                     | 1,469                    | 320                                       | 574           | 16,624                |
| Women | 56,610  | 10,343 | 3,326   | 18,630                     | 1,362                    | 222                                       | 294           | 22,433                |
| Total | 104,454 | 18,926 | 8,315   | 33,915                     | 2,831                    | 542                                       | 868           | 39,057                |

**Source:** Statistical Office of the Republic of Srpska, 2025

By gender, men with disabilities make up approximately 4.92% of the total male population, while women with disabilities make up about 4.25% of the total female population. These data show that the participation of people with disabilities is slightly higher among men than among women, despite the fact that women make up a larger proportion of the total population.

Further analysis by type of disability shows that certain types of disabilities are more pronounced in men, especially difficulties in moving and climbing stairs, while difficulties in the field of self-care and communication are relatively more common in women.

Such a structure can be the result of a variety of factors, including differences in risk exposure, occupational structure, lifestyle habits, and health patterns between men and women. At the same time, these findings are important for planning targeted policies and marketing strategies, as they point to the need for a differentiated approach depending on gender.

The data also further highlight the importance of segmenting the population of persons with disabilities, not only by type of disability and age groups, but also by gender, in order to ensure adequate support measures, inclusive programs and access to information.

In order to assess the correlation between age structure and visual difficulties in the Republic of Srpska, the  $\chi^2$  independence test was applied. Given that visual impairments were previously identified as a statistically

significant factor associated with the use of assistive technologies, their distribution by age groups was further analyzed. The results showed significant differences in the incidence of visual difficulties between age groups.

**Table 3.** Distribution of people with visual impairments by age groups and  $\chi^2$  test results

| Age group      | Number of people with visual impairments | The total number in the group | Expected number | Significance $\chi^2$ |
|----------------|------------------------------------------|-------------------------------|-----------------|-----------------------|
| Under 15 years | 285                                      | 1,225                         | 218             | 19.2                  |
| 15-19          | 228                                      | 814                           | 144             | 55.8                  |
| 20-29          | 485                                      | 1,786                         | 315             | 64.3                  |
| 30-49          | 2,254                                    | 11,406                        | 2,011           | 28.5                  |
| 50-59          | 4,271                                    | 18,384                        | 3,243           | 95.2                  |
| 60-64          | 2,730                                    | 12,612                        | 2,227           | 52.7                  |
| 65 and more    | 8,673                                    | 58,227                        | 10,283          | 101.4                 |

**Note:** The expected number is calculated according to the proportion of the total number of persons with visual impairments in the total population of persons with disabilities ( $18,926/104,454 \approx 18.1\%$ )

**Source:** Author's research (2026)

The  $\chi^2$  test shows statistically significant differences in the incidence of visual difficulties between age groups ( $p < 0.001$ ).

In younger groups (under 30 years of age), the incidence of visual impairment is relatively high in relation to the overall size of the group, which may indicate congenital or early forms of visual impairment.

In older groups (50+), the absolute number of people with visual impairments increases, reflecting age-related degenerative changes in vision.

This statistical analysis confirms that the correlation between age group and type of visual impairment is significant, which is crucial for planning health and rehabilitation programs adapted to the age structure.

In order to statistically verify the correlation between gender and type of disability in the Republic of Srpska, the  $\chi^2$  (chi-squared) independence test was applied. The test was used to determine whether there was a significant difference in the distribution of certain types of difficulties between men and women.

**Table 4.** Results of  $\chi^2$  test of independence between sex and type of difficulty

| Type of difficulty                        | $\chi^2$ value | p-value |
|-------------------------------------------|----------------|---------|
| Visual                                    | 92.7           | < 0.001 |
| Hearing                                   | 34.5           | < 0.001 |
| Walking or climbing stairs                | 412.1          | < 0.001 |
| Memory and concentration                  | 14.8           | 0.0001  |
| Dressing and maintaining personal hygiene | 32.2           | < 0.001 |
| Communication                             | 75.6           | < 0.001 |
| Multiple difficulties                     | 48.9           | < 0.001 |

**Source:** Author's research (2026)

All tested types of difficulties show a statistically significant correlation with sex, with p-values significantly less than 0.05.

Men are especially more represented in the category of walking or climbing stairs, while women are relatively more represented in the categories of self-care and communication.



These results confirm the observed differences in Table 2 and point to the need for a differentiated approach in the planning of policies, support programmes and inclusive strategies according to gender.

Accordingly, the application of the principles of inclusive marketing should focus on:

1. Physical barriers limit access to retail facilities,
2. Unresponsive digital content makes it difficult to access information.
3. The lack of alternative communication channels reduces the availability of products and services.

The discrepancy between the structure of the population and standard marketing practices is the basis for empirical confirmation of the hypothesis that insufficient recognition and adaptation of market access to these groups can significantly limit their economically and socially active participation.

## DISCUSSION

The results of the research clearly show that the population of persons with disabilities is not homogeneous and that there are statistically significant differences in structure according to the type of difficulty, gender and age groups. The largest share is made up of people with mobility difficulties, followed by people with visual and hearing impairments. Gender analysis, confirmed by the  $\chi^2$  independence test, shows that men are significantly more represented in the categories of difficulties in moving and climbing stairs, while women are relatively more represented in the categories of difficulties in independent care and communication. These findings confirm that gender plays a significant role in the distribution of disability types and indicate the need for a differentiated approach in policy planning and marketing strategies.

In addition,  $\chi^2$  analysis by age groups and visual difficulties shows significant differences between age categories. Younger age groups (under 30 years) have a relatively high proportion of people with visual impairments, indicating congenital or early forms of impairment, while in older groups the absolute number of people with visual impairments increases, reflecting age-related degenerative changes. These results emphasize that disability does not manifest itself uniformly throughout the life span and that the age structure significantly affects the type and frequency of difficulties.

In the context of the literature to date, the results are consistent with the findings of Lee et al. (2024) and Masiello et al. (2024), Inclusive campaigns must be based on the real needs of target groups in order to achieve an engagement and inclusion effect. Also, the results confirm the conclusions of Poulsen and Umar (2025), and Södergren i Vallström (2025) Digital and physical accessibility are key factors in the market inclusion of people with disabilities.

This paper contributes to the literature by combining empirical analysis of demographic data with the evaluation of marketing practices, which has rarely been addressed in previous research. Based on the results, it is clear that support strategies and inclusive policies must not be uniform, but must correspond to the specific characteristics of individual groups, taking into account both biological and social factors.

## CONCLUSION

This paper investigates the characteristics of the population of persons with disabilities in the Republic of Srpska and their specific needs that may affect market inclusion. Analysis of demographic data, including age structure and gender, and the application of the  $\chi^2$  independence test, showed that the population of persons with disabilities has clearly defined segmentation characteristics that require attention when planning access to products, services and communication. The results indicate the existence of significant differences across gender and age groups, as well as structural barriers that can limit access to information, products and services, thereby reducing the economic and social inclusion of these groups.

The paper contributes to the theory of inclusive marketing by showing that quantitative analysis of



demographic data can provide precise guidelines for designing an approach focused on the real needs of different segments of the population. An inclusive approach is not only a matter of social responsibility, but also an opportunity to better engage consumers and increase market potential.

In practical terms, the results suggest the need for:

1. Creating communications and campaigns that respond to the specific needs of the dominant segments, especially in accordance with differences in gender and age groups,
2. improving physical and digital accessibility, adapted to specific types of difficulties;
3. integrating the principles of inclusiveness into broader social responsibility initiatives.

At the same time, the paper lays the groundwork for future research that could use data over time and experimental methods to further assess the impact of an inclusive approach on the market inclusion of marginalized groups. Such an approach would enable the creation of policies and initiatives that are at the same time ethically responsible, effective and oriented to the real needs of all segments of the population, confirming the importance of empirical analysis in shaping inclusive strategies.

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# SANITATION AND HAND HYGIENE FACILITIES IN PRIMARY SCHOOLS IN BOSNIA AND HERZEGOVINA ASSESSED BY PUPILS USING WHO INDICATORS

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**Abstract:** Numerous studies have demonstrated that students attending schools with adequate sanitary and hygienic conditions achieve better academic performance, experience lower rates of illness, and consequently have reduced absenteeism. This study aimed to assess students' perceptions of sanitation and hand hygiene facilities in schools using World Health Organization (WHO) indicators. The research was conducted as a cross-sectional epidemiological study from September 2019 to March 2020 in the Republic of Srpska, Bosnia and Herzegovina. A total of 2,508 students, aged 11 to 15 years, participated in the study. The survey results indicated that 48.6% of students were dissatisfied with school toilets, while 30.1% reported dissatisfaction with handwashing facilities. Additionally, 83.2% of students expressed dissatisfaction with the availability of toilet paper, and 72.4% were dissatisfied with the supply of soap. Consequently, 66.8% of students reported avoiding school toilets on a daily basis. Furthermore, approximately half of the students reported receiving education on proper hygiene practices. Ensuring access to safe water, adequate sanitation, and comprehensive hygiene education is essential for reducing morbidity and mortality related to unsafe water and poor sanitation. Such improvements contribute to better overall health, reduced poverty, and enhanced socio-economic development.

**Keywords:** hygiene, education, pupils, sanitation, water

**JEL classification:** M31, M14, J16, I38, L20

## INTRODUCTION

Safe drinking water, sanitation, and hygiene (WASH) are crucial for health and development, especially in low and middle-income countries where WASH-related diseases are prevalent. Acute infectious diseases remain among the most prevalent health issues in the school-aged population. Their occurrence is influenced by inadequate hygiene practices, insufficient access to clean water, and poor sanitation. Additionally, the high density of children in confined spaces and frequent close contact facilitate the rapid spread of infections (Nabi MH et al., 2025). Globally, diarrheal diseases, malaria, and lower respiratory tract infections are among the leading causes of child mortality (UN IGME, 2025). Children spend a significant portion of their day at school, where WASH services can impact pupil learning, health, and dignity, particularly for girls. Water, Sanitation, and Hygiene (WASH) are fundamental human and child rights, and ensuring proper WASH facilities is essential for creating a safe school environment that promotes equal opportunities for high-quality education and the healthy development of children (WHO, 2019a). Schools should provide a comfortable and supportive setting that fosters appropriate cultural norms and values (WHO, 2019 b). Approximately 75% of school absenteeism is linked to illness, highlighting the importance of personal and environmental hygiene in reducing disease-related absences. Proper hygiene practices help lower the

burden of disease, thereby improving school attendance and positively impacting students' academic performance (WHO, 2019b). However, a significant proportion of students do not use school toilets regularly due to various factors, including lack of privacy, poor hygiene conditions, unpleasant odors, inadequate supplies of toilet paper, soap, and hand towels, as well as insufficient ventilation. As a result, students may neglect their physiological needs, leading to dehydration, digestive issues, urinary tract infections, and other infectious diseases, which can further contribute to school absenteeism (WHO, 2019b). Still, 2.1 billion people lacked safely managed drinking water, 1.5 billion had basic services, 287 million had limited services, 302 million relied on unimproved sources, and 106 million collected water directly from surface water sources such as rivers and lakes. Also, 3.4 billion people still lack safely managed sanitation services, 1.9 billion have only basic services, 560 million have limited services, 555 million use unimproved facilities, and 354 million continue to practise open defecation (UN IGME, 2025). Ensuring access to safe water, proper sanitation, and hygiene education can significantly reduce morbidity and mortality associated with unsafe water and inadequate sanitation, ultimately leading to improved health, poverty reduction, and socio-economic development (CDC, 2025). This study aims to assess pupils' perceptions of sanitation and hand hygiene facilities in schools, providing insights into the current state of WASH infrastructure and its impact on students' well-being and academic performance.

## MATERIAL AND METHODS

This study is part of the WASH baseline research conducted in the Republic of Srpska, Bosnia and Herzegovina. The Ministry of Education and Culture of the Republic of Srpska granted approval for the research (07.041/052-4149/19). Before visiting the schools, the responsible school staff were informed, and they conveyed this information to parents and children, who were thereby informed and provided their consent to participate in the survey. The study was conducted between September 2019 and March 2020. At the beginning of the 2019/2020 school year, the total number of students in higher grades was 39,225 (Republic of Srpska Institute of Statistics, 2020). A total of 2,508 students participated in the research, of whom 51.4% ( $n = 1,289$ ) were girls and 48.6% ( $n = 1,219$ ) were boys. To assess the hygiene and sanitation conditions in schools, a questionnaire based on WHO indicators was used (WHO, 2019a). The questionnaire was translated into the local language and adapted to best reflect conditions, terminology, and national requirements in the Republic of Srpska. The survey targeted students aged 11–15, with a sample size of 50 students per school (25 girls and 25 boys), selected randomly. Students received the questionnaire in written form and completed it voluntarily and independently, with the option to ask researchers for clarification if needed. The questionnaire was anonymous, collecting only age and gender in addition to responses related to hygiene, sanitation, and water supply satisfaction. The survey was conducted in 43 primary schools, with an average of 58 students per school (29 girls and 28 boys). In accordance with methodological requirements, only schools with a sufficient number of students above the fifth grade were included, while no surveys were conducted in schools with fewer or younger pupils. The traffic light model was used to interpret the answers of pupils about hygiene, sanitation and access to water (Wendland, 2013):

- If 0-33% of pupils are satisfied, the situation is unsatisfactory and requires significant improvements (**red**)
- If 34-66% of pupils are satisfied, the situation is better but still requires significant improvements (**yellow**)
- If 67-100% of pupils are satisfied, the situation is satisfactory and requires small improvements (**green**)

The collected data were statistically analyzed using IBM SPSS Statistics (version 22). Statistical procedures included descriptive statistics with graphical data representations, statistical inference, and dynamic statistics. Categorical variables were summarized as frequencies and percentages, while numerical variables were presented using measures of central tendency, including arithmetic mean (mean) and standard deviation (SD).

## RESULTS

**Table 1** shows the characteristics of surveyed pupils in primary schools. Table 1 shows that 94.7% of the participants were aged 12, 13, and 14 years. Considering that the surveyed pupils were from the 6th to the 9th grade, this age structure is expected. The mean age of the participants was 13.1 years. The questionnaire included items assessing satisfaction with hygiene, sanitation, and water supply.

**Table 1.** Demographic Characteristics of the Participants

| Age        | Boys<br>N (%)      | Girls<br>N (%)     | All<br>N (%)        |
|------------|--------------------|--------------------|---------------------|
| 11         | 14 (60.9)          | 9 (39.1)           | 23 (0.92)           |
| 12         | 311 (44.3)         | 391 (55.7)         | 702 (28.0)          |
| 13         | 417 (49.0)         | 434 (51.0)         | 851 (33.9)          |
| 14         | 413 (50.2)         | 409 (49.8)         | 822 (32.8)          |
| 15         | 64 (58.2)          | 46 (41.8)          | 110 (4.4)           |
| <b>ALL</b> | <b>1289 (51.4)</b> | <b>1219 (48.6)</b> | <b>2508 (100.0)</b> |

Data collection activities are summarized in **Table 2**.

Approximately 90% of pupils reported that water was consistently available. Most pupils reported that toilets were easily accessible (70.1%). However, nearly half of the pupils expressed dissatisfaction with the existing toilet facilities (Table 2). The primary source of dissatisfaction was the lack of toilet paper. The next reason for dissatisfaction was toilet hygiene, actually, about 40% of pupils were dissatisfied with toilet hygiene. Consequently, only 32.8% of pupils reported using school toilets on a daily basis. Approximately one-third of the pupils were dissatisfied with handwashing facilities. The main reason for dissatisfaction was the lack of soap, reported by 72.4% of pupils.

**Table 2.** Results of Pupil Questionnaire Surveys on Sanitation and Hygiene

| Questions                                                   | Results of Pupil Questionnaire Surveys |                    |                      |                    |
|-------------------------------------------------------------|----------------------------------------|--------------------|----------------------|--------------------|
|                                                             | Yes<br>N (%)                           | No<br>N (%)        | Do not know<br>N (%) | No answer<br>N (%) |
| <b>Sanitation</b>                                           |                                        |                    |                      |                    |
| Can pupils complain about the poor condition of the toilet? | 988 (39.4)                             | 484 (19.3)         | 974 (38.8)           | 62 (2.5)           |
| Do school staff take action on pupils complaints?           | 534 (21.3)                             | 281 (11.2)         | 612 (24.4)           | 1081 (43.1)        |
| Do pupils use toilet every day?                             | 824 (32.8)                             | <b>1675 (66.8)</b> | -                    | 9 (0.4)            |
| Do toilets provide privacy?                                 | 1051 (41.9)                            | 851 (33.9)         | 583 (23.3)           | 23 (0.9)           |
| Are toilets easily accessible?                              | 1759 (70.1)                            | 363 (14.5)         | 361 (14.4)           | 25 (1.0)           |
| Is toilet paper being provided in the toilet booths?        | 206 (8.2)                              | <b>2088 (83.2)</b> | 200 (8.0)            | 14 (0.6)           |
| Are toilets clean?                                          | 1012 (40.4)                            | 1025 (40.9)        | 445 (17.7)           | 26 (1.0)           |
| Are pupils satisfied with toilets?                          | 726 (29.0)                             | 1220 (48.6)        | 554 (22.1)           | 8 (0.3)            |
| <b>Hygiene</b>                                              |                                        |                    |                      |                    |

|                                                           |             |                    |            |            |
|-----------------------------------------------------------|-------------|--------------------|------------|------------|
| Have pupils been taught good hygiene practice at schools? | 1259 (50.2) | 495 (19.7)         | 652 (26.0) | 102 (4.1)  |
| Do you wash your hands at school?                         | 2172 (86.6) | 313 (12.5)         | -          | 23 (0.9)   |
| Is there enough soap?                                     | 488 (19.5)  | <b>1817 (72.4)</b> | 187 (7.5)  | 16 (0.6)   |
| Do you use soap to wash your hands?                       | 1200 (47.8) | 890 (35.5)         | -          | 418 (16.7) |
| Is there always enough water?                             | 2202 (87.8) | 184 (7.3)          | 110 (4.4)  | 12 (0.5)   |
| Are hand washing areas clean?                             | 1402 (55.9) | 710 (28.3)         | 375 (15.0) | 21 (0.8)   |
| Are pupils satisfied with hand washing area?              | 1230 (49.0) | 754 (30.1)         | 348 (13.9) | 176 (7.0)  |

Boys were significantly more dissatisfied with toilet conditions compared to girls (**Table 3**). Also 86,6% of the pupils stated that they regularly washed their hands at school and 47.8% use soap “if available“, which speaks of their good hygiene knowledge. In terms of education on good hygiene practice, about half of the examined pupils answered “yes” while 26% of pupils answered “don’t remember”.

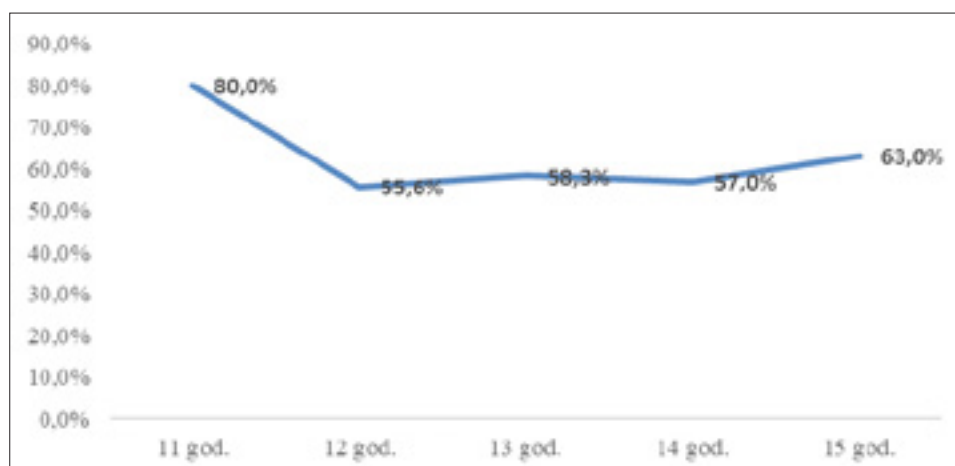
**Table 3.** Results of Pupil Questionnaire Surveys on Sanitation and Hygiene by gender

| Questions                                                   | Boys          |              |                          | Girls         |              |                       |
|-------------------------------------------------------------|---------------|--------------|--------------------------|---------------|--------------|-----------------------|
|                                                             | Yes<br>N ( %) | No<br>N ( %) | Do not<br>know<br>N ( %) | Yes<br>N ( %) | No<br>N ( %) | Do not know<br>N ( %) |
| <b>Sanitation</b>                                           |               |              |                          |               |              |                       |
| Can pupils complain about the poor condition of the toilet? | 461(37.8)     | 258 (21.7)   | 471 (38.6)               | 527 (40.8)    | 226 (17.5)   | 503 (39.0)*           |
| Do pupils use toilet every day?                             | 467 (38,3)    | 748 (61,4)   | -                        | 357 (27,7)    | 927 (71.9) * | -                     |
| Do toilets provide privacy?                                 | 467 (38.3)    | 487 (39.9)   | 252 (20. 7)              | 584 (45.3)    | 364 (28.2)   | 331 (25.7)***         |
| Is toilet paper being provided in the toilet booths?        | 112 (9.2)     | 986 (80.9)   | 115 (9.5)                | 94 (7.3)      | 1102 (85.5)  | 85 (6.60)**           |
| <b>Hygiene</b>                                              |               |              |                          |               |              |                       |
| Is there enough soap?                                       | 234 (19.2)    | 863 (70.8)   | 112 (9.2)                | 254 (19.8)    | 954 (74.01)  | 75 (5.7)***           |
| Are pupils satisfied with hand washing area?                | 638 (52.3)    | 339 (27.8)   | 157 (12.9)               | 592 (45.9)    | 415 (32.2)   | 191 (14.8)*           |

$\chi^2$  Chi-Square test: \*  $p < 0,05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0,001$ .

**Figure 1** presents the percentage of pupils who use soap when washing their hands.

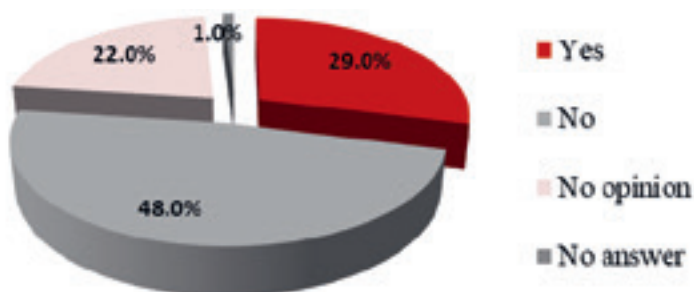
**Figure 1.** Percentage of pupils using soap for handwashing





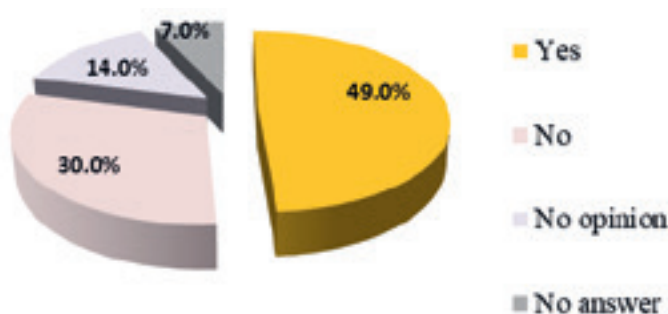
According to the traffic light model, toilet conditions were classified as unsatisfactory (red), indicating a need for substantial improvements. Only 29% of pupils reported being satisfied with school toilets (**Figure 2**).

**Figure 2.** Pupils' satisfaction with toilet



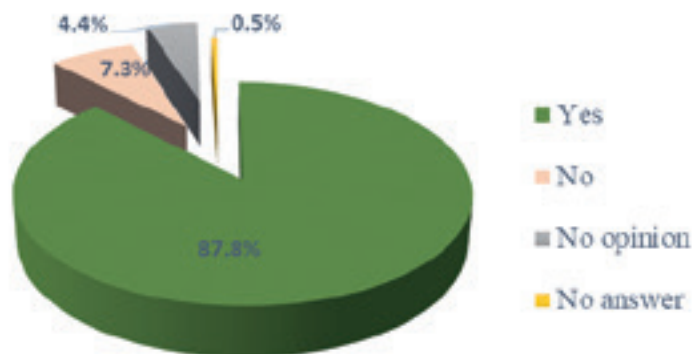
Pupils' satisfaction with handwashing facilities was classified as requiring minor improvements (yellow), as 49% of pupils stated that they were satisfied with the handwashing area (**Figure 3**).

**Figure 3.** Pupils' satisfaction with handwashing facilities



According to the traffic light model, satisfaction with access to water was classified as satisfactory (green). Approximately 87.8% of pupils reported that water was always available (**Figure 4**).

**Figure 4.** Pupils' satisfaction with access to water



## DISCUSSION

The survey shows that most children are not satisfied with their school toilets, and many of them avoid using toilets. as a result, 66.8% of pupils reported not using school toilets on a daily basis. The fact that



a large number of students avoid using school toilets highlights the behavioral consequences of inadequate WASH conditions, indicating that infrastructural deficiencies directly translate into unhealthy practices with potential for long-term health implications. The same study conducted in Croatia showed that 44.5% of students do not use the toilet, with the most common reason being the lack of toilet paper (Capak et al., 2015). Dissatisfaction with school toilets is also related to bladder and bowel dysfunction in schoolchildren, regardless of age and gender (Jørgensen, Breinbjerg, Rittig, Kamperis, 2021). Sometimes, girls and female teachers are more affected than boys because the dissatisfaction with school toilets means that they cannot attend school during menstruation (Adams J, Bartram J, Chartier Y, Sims J, 2009). If such facilities are not available, adolescent girls may be unable to remain comfortably in class (UNICEF, 2012). The Government of Republika Srpska adopted a conclusion in August 2019 on the implementation of reform processes in the field of upbringing and education, according to which schools should provide a healthy, safe, and stimulating environment where the child is at the center of the educational process (Cvijanović, 2020).

Children receive information by seeing, smelling, hearing and touching. Spaces they encounter, including water, sanitation and hand-washing facilities, can provide a range of positive and negative experiences related to colours, smells, shapes and sounds (UNICEF, 2012). Hand hygiene is one of the most fundamental and effective personal hygiene measures for safeguarding children against infectious diseases (Klar et al., 2022). The pupils were dissatisfied with handwashing facilities. The main reason was the lack of soap, with 72.4% of pupils reporting dissatisfaction with the soap supply. The importance of these results lies in the fact that they clearly indicate that inadequate sanitation and hygiene conditions in schools represent a significant public health problem. Poor availability of basic resources such as toilet paper and soap can increase the risk of infectious diseases, which ultimately affects school attendance and academic performance. In a study conducted in Croatia, the same problem was reported by 74.59% of students (Capak et al., 2015). Facilities should stimulate children's learning and development and be age appropriate. According to the World Health Statistics 2016, 69% of schools provided water and soap in the hand washing facilities, 12% of schools provided water but no soap while 19% of schools had no water supply at all. About 620 million children worldwide do not have access to sanitary services in schools (WHO, 2018). Each school should work to develop adequate knowledge, attitudes and skills on hygiene through life skills-based hygiene education and child participation (UNICEF, 2012). Facilities must be close to the schools, have sufficient capacity, with enough toilets, be sized appropriately and simple to use and have water and soap available at all times for hand washing. The facilities must provide sufficient capacity and minimal waiting time (UNICEF, 2012). In all schools surveyed, toilets are located within the school building and are available to pupils. The physical environment and cleanliness of a school facility can significantly affect the health and well-being of children. Disease spreads quickly in collectives, where hand-washing facilities or soap are not available, and where toilets are in disrepair. Too often, schools are places where children become ill (UNICEF, 2012). About three billion people worldwide, do not have access to handwashing facilities with soap. People living in rural areas and low-income countries are the most vulnerable and the most affected (UNICEF, 2026). In bad hygienic conditions, children are exposed to diseases and risk infection. There is a direct link between diarrhoea and hygiene in schools. A high percentage of diarrheal disease (88%) is caused by unsafe water supply, inadequate sanitation, and poor hygiene. Diarrhoea is a significant reason why children are absent from school. Diarrhoea is also behind chronic undernutrition and growth retardation (UNICEF, 2012). Access to safe water, adequate sanitation, and adequate hygiene education can reduce morbidity and mortality from unsafe water and sanitation-related diseases, leading to improved health, poverty reduction, and socio-economic development (CDC, 2025).

## CONCLUSION

The main findings of the survey conducted in primary schools indicate that 66.8% of pupils do not use school toilets on a daily basis, while 83.2% reported a lack of toilet paper and soap. Additionally, 72.4% of pupils reported the absence of soap. Also, half of the pupils stated that they regularly washed their hands at school with soap “if available“, which speaks of their good hygiene knowledge. Their comment “if available” indicates that students would use soap to wash their hands if the school provided it, which means that students are aware of the importance of hygiene practices. The results of this study are particularly relevant for policy and practice, as they indicate that relatively simple and inexpensive interventions, such as ensuring the constant availability of soap and toilet paper, can significantly improve hygiene habits and reduce health risks among school children. Public health policies should focus on improving WASH in schools to ensure that students stay healthy, primarily handwashing and toileting conditions.

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## Acknowledgements

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