USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) AMONG FUEL STATION ATTENDANTS IN THE FEDERAL DISTRICT: SOCIODEMOGRAPHIC PROFILE, EVALUATION AND CRITICAL ANALYSIS

USO DE EQUIPAMENTOS DE PROTEÇÃO INDIVIDUAL (EPIS) ENTRE TRABALHADORES FRENTISTAS DO DISTRITO FEDERAL: PERFIL SOCIODEMOGRÁFICO, AVALIAÇÃO E ANÁLISE CRÍTICA

USO DE EQUIPO DE PROTECCIÓN PERSONAL (EPP) ENTRE LOS ATENDEDORES DE ESTACIONES DE SERVICIO EN EL DISTRITO FEDERAL: PERFIL SOCIODEMOGRÁFICO, EVALUACIÓN Y ANÁLISIS CRÍTICO

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José Maria Viana dos Santos[1], Luciana da Cunha Freitas[2], Márcio Nakanishi[3]

ABSTRACT

Introduction: Occupational exposure to fuel vapors, especially benzene, poses a serious health risk to gas station attendants. Effective protection depends on the correct use of Personal Protective Equipment (PPE), in accordance with current regulations, combined with other health protection measures, such as environmental monitoring, worker health surveillance, and safe workplace practices.

Objective: To assess the sociodemographic profile of gas station attendants in the Federal District and critically analyze the use of PPE, especially respiratory protection, in the context of occupational exposure.

Methods: Observational, cross-sectional study conducted with 116 gas station workers. Structured questionnaires and smell tests using a digital smell device were administered. Direct observations complemented the analysis. The study was approved by the Research Ethics Committee, in accordance with the ethical precepts for research involving human subjects.

Results: Fifty-one gas stations were visited. Low PPE use was observed, with uniforms being the only equipment seen by 100% of participants (n=116). Masks, gloves, waterproof aprons, and ear protectors were not observed. Only 2.6% (n=3) of gas station attendants reported using some type of PPE against gases or particles. Most attendants (62.8%; n=71) recognize the importance of PPE but do not use it due to a lack of supply. Masks were mentioned by 40 participants as the most necessary item, followed by mask and glove combinations (24 participants), and other PPE such as goggles, earplugs, and chemical masks were mentioned

[1]Occupational Health Nurse. Master in Public Health. Universidade de Brasília (UnB).
E-mail: vianasaude.com@gmail.com Orcid: https://orcid.org/0000-0002-3318-6679
Lattes: http://lattes.cnpq.br/0385839483661112
[2]Librarianship. Postgraduate in Strategic Management of Information Systems Hospital. Universitário de Brasília (UnB).
E-mail: lucianadacunhafreitas@gmail.com Orcid: https://orcid.org/0000-0003-1951-6245
Lattes: http://lattes.cnpq.br/5276631852564226
[3]Otorhinolaryngology Medicine. Universidade de Brasília (UnB).
E-mail: nakanishimarcio@gmail.com Orcid: https://orcid.org/0000-0002-8010-3688
Lattes: http://lattes.cnpq.br/1505777798378860

by only 3 participants. A lack of safety signage was common at gas stations, especially regarding the risks of benzene.

Conclusion: The lack of adequate PPE and some signage at gas stations demonstrates noncompliance with safety standards, increasing the risk of health problems for workers. It is recommended to intensify inspection, training and the mandatory provision of PPE

Keywords: Personal Protective Equipment. Gas Station Attendants. Workers' Health. Occupational Exposure. Benzene.

RESUMO

Introdução: A exposição ocupacional a vapores de combustíveis, especialmente ao benzeno, representa um risco grave à saúde dos trabalhadores frentistas. A proteção com mais efetividade depende do uso correto de Equipamentos de Proteção Individual (EPIs), conforme normas regulamentadoras vigentes, combinado com outras ações para proteção da saúde, como monitoramento ambiental, vigilância da saúde do trabalhador e práticas seguras no ambiente de trabalho.

Objetivo: Avaliar o perfil sociodemográfico dos trabalhadores frentistas do Distrito Federal e analisar criticamente o uso de EPIs, especialmente a proteção respiratória, no contexto da exposição ocupacional.

Métodos: Estudo observacional, transversal, realizado com 116 trabalhadores de postos de combustíveis. Foram aplicados questionários estruturados e testes de olfato utilizando dispositivo digital de Cheiro. Observações diretas complementaram a análise. O estudo foi aprovado pelo Comitê de Ética em Pesquisa, em conformidade com os preceitos éticos para pesquisas envolvendo seres humanos.

Resultados: Foram visitados 51 postos de gasolina. Foi constatada baixa utilização de EPIs, sendo o uniforme (fardamento) o único equipamento visualizado em 100% dos participantes (n=116). Máscaras, luvas, aventais impermeáveis e protetores auriculares não foram observados. Apenas 2,6% (n=3) dos frentistas relataram utilizar algum tipo de EPI contra gases ou partículas. A maioria dos frentistas (62,8%; n=71) reconhece a importância dos EPIs, mas não os utiliza por ausência de fornecimento. A máscara foi mencionada por 40 participantes como o item mais necessário, seguida da combinação máscara e luvas (24 participantes), e outros EPIs como óculos, tampões auriculares e máscara química foram mencionados por apenas 3 participantes. A falta de sinalização de segurança foi frequente nos postos, especialmente em relação aos riscos do benzeno.

Conclusão: A ausência de EPIs adequados e de algumas sinalizações nos postos de combustíveis evidencia descumprimento das normas de segurança, aumentando o risco de agravos à saúde dos trabalhadores. Recomenda-se intensificar a fiscalização, a capacitação e o fornecimento obrigatório de EPIs

Palavras-chave: Equipamentos de Proteção Individual. Frentistas. Saúde do Trabalhador. Exposição Ocupacional. Benzeno.

RESUMEN

Introducción: La exposición ocupacional a vapores de combustible, especialmente benceno, representa un grave riesgo para la salud de los trabajadores de las estaciones de

servicio. Una protección más eficaz depende del uso correcto de los Equipos de Protección Individual (EPP), de acuerdo con las normas regulatorias vigentes, combinado con otras acciones de protección de la salud, como el monitoreo ambiental, la vigilancia de la salud de los trabajadores y las prácticas seguras en el lugar de trabajo.

Objetivo: Evaluar el perfil sociodemográfico de los trabajadores de gasolineras del Distrito Federal y analizar críticamente el uso de EPP, especialmente protección respiratoria, en el contexto de exposición ocupacional.

Métodos: Estudio observacional, transversal, realizado con 116 trabajadores de estaciones de servicio. Se aplicaron cuestionarios estructurados y pruebas de olfato utilizando un dispositivo olfativo digital. Las observaciones directas complementaron el análisis. El estudio fue aprobado por el Comité de Ética en Investigación, de acuerdo con los preceptos éticos para la investigación en seres humanos.

Resultados: Se visitaron 51 gasolineras. Se observó un bajo uso de EPP, siendo el uniforme el único equipo visto por el 100% de los participantes (n=116). No se observó el uso de mascarillas, guantes, delantales impermeables ni protectores auditivos. Sólo el 2,6% (n=3) de los empleados de gasolineras reportaron utilizar algún tipo de EPP contra gases o partículas. La mayoría de los empleados de gasolineras (62,8%; n=71) reconocen la importancia del EPP, pero no lo utilizan por falta de suministro. La mascarilla fue mencionada por 40 participantes como el artículo más necesario, seguida por la combinación de mascarilla y guantes (24 participantes), y otros EPP como gafas, tapones para los oídos y mascarilla química fueron mencionados solo por 3 participantes. La falta de señalización de seguridad era común en las gasolineras, especialmente respecto a los riesgos del benceno.

Conclusión: La falta de EPP adecuado y de cierta señalización en las gasolineras demuestra el incumplimiento de las normas de seguridad, aumentando el riesgo de daño a la salud de los trabajadores. Se recomienda intensificar la inspección, la formación y la dotación obligatoria de EPI.

Palabras clave: Equipo de Protección Personal. Auxiliares de Gasolinera. Salud de los Trabajadores. Exposición Ocupacional. Benceno.

1 INTRODUCTION

Occupational exposure to benzene constitutes a serious risk to the health of workers at gas stations. Benzene is a volatile and carcinogenic substance (1), capable of causing hematological alterations, such as aplastic anemia and leukemia (2), as well as dysfunctions in the nervous, respiratory and olfactory systems (3). Its toxicity is relevant even in short-term exposures, with absorption possible both through the respiratory route and through the dermis (4).

To protect exposed workers, Brazil has established several Regulatory Standards (NRs):

- **NR-6** (5) defines the obligations regarding the supply and use of Personal Protective Equipment.
- **NR-9** (6) provides guidance on the control of physical, chemical and biological risks in the workplace.
- **NR-15** (7) classifies unhealthy activities and defines tolerance limits for harmful agents such as benzene.
- **NR-20** (8) establishes safety measures for activities with flammables and combustibles, including handling and storage.

Despite this normative framework, the effective protection of gas station attendants still faces serious flaws. The insufficiency in the supply of PPE and in the supervision of its use favors the continuity of exposure to harmful chemical agents, aggravating the occupational vulnerability of these workers.

In this context, this study analyzes the profile of gas station attendants in the Federal District and investigates the reality of the use of PPE in this group, focusing on the identification of failures and proposing improvements.

2 OBJECTIVES

2.1 MAIN OBJECTIVE

To analyze the sociodemographic profile of gas station attendant workers in the Federal District and the use of Personal Protective Equipment (PPE) at gas stations.

2.2 SECONDARY OBJECTIVES

- Verify the perception of workers regarding the importance of PPE.
- Evaluate the presence of safety signs at the stations.
- Identify the main factors associated with the non-use of PPE.

3 METHODOLOGY

This is a cross-sectional observational study, approved by the Ethics Committee of the University of Brasília (CAAE: 77625724.0.0000.5558. Approval opinion: 6.785.144).

3.1 POPULATION STUDIED

Gas station attendants formally employed at gas stations in the Federal District.

3.2 INCLUSION CRITERIA

Workers over 18 years of age, with a formal employment relationship and working as a gas station attendant.

3.3 EXCLUSION CRITERIA

Workers who refused to participate or had medical conditions capable of altering olfactory function (history of recent COVID-19, nasal diseases, nasal surgeries, etc.).

3.4 COLLECTION INSTRUMENTS

- Structured questionnaire addressing sociodemographic data, risk perception and use of PPE.
- Smell test performed with Digital Smell Device (Multiscent-20).
- Direct observations of working conditions, use of PPE and safety signage.

Note: The smell test will be the subject of in-depth analysis in future articles derived from this research.

4 RESULTS

4.1 SOCIODEMOGRAPHIC PROFILE

- Gender: 74.1% men and 25.9% women.
- Age group: average of 37.4 years, ranging from 19 to 59 years.
- Ethnicity: 60.3% brown, 17.2% black, 15.5% white, 3.4% indigenous and 3.4% yellow.
- Education: 66.4% had completed high school or incomplete higher education.
- Length of service: 61.2% had been in the position for five years or more.

Table 1

Sociodemographic Profile of the Participants (n = 116)

Variable	Category	n(%)
Gender	Male	86 (74,1%)
	Female	30 (25,9%)
Age group	Average (min.–max.)	37.4 years (19–59)
Ethnicity	Brown	70 (60,3%)
	Black	20 (17,2%)
	White	18 (15,5%)
	Indigenous	4 (3,4%)
	Yellow	4 (3,4%)
Schooling	Complete high school or incomplete higher education	77 (66,4%)
Length of service	≥ 5 years as a gas station attendant	71 (61,2%)

Source: Prepared by the authors

4.2 ACTIVITIES DEVELOPED BY GAS STATION ATTENDANTS

The activities carried out by the gas station attendants include fueling vehicles with liquid fuels, calibrating tires, checking oil and water levels, surface washing of vehicles, customer service, receipt of amounts related to supplies and sale of automotive products. These functions expose workers to fuel vapors, environmental noise, temperature variations, risks of being run over, and episodes of violence (10).

4.3 USE OF PERSONAL PROTECTIVE EQUIPMENT

It was found that all workers who responded to the survey were in uniform, and the uniform (uniform) was the only Personal Protective Equipment (PPE) visible at the time of data collection. No respiratory protection masks, waterproof gloves or ear protectors were seen among gas station attendants in the workplace.

Regarding the answers to the questionnaires, it was found that the vast majority of gas station attendants (113; 97.4%) reported not using PPE regularly. Only 3 participants (2.6%) stated that they used some type of protection against gases or particles suspended in the air. However, it is important to highlight that, at the time of the approach to apply the questionnaires, even the three workers who reported using PPE in addition to the uniform were not actually wearing any additional protective equipment. This finding reinforces the discrepancy between the perception and practice of individual protection in the workplace.

According to the current Regulatory Standards (5-8), mandatory PPE for workers exposed to fuels include:

- Masks with specific filter for chemical and organic vapors.
- Hydrocarbon resistant waterproof gloves.
- Splash protection goggles.
- Apron or protective clothing (against contact with flammable products)
- Ear protectors, according to ambient sound pressure levels.

The absence of this equipment, both in supply and use, represents serious non-compliance with legal requirements.

Table 2

PPE

PPE Visualized	Frequency (%)
Uniform	100%
Mask	0%
Glove	0%
Ear Protector	0%

Source: Prepared by the authors

4.4 SAFETY SIGNS

It was found that most of the stations did not have some mandatory signs of chemical risk or requirement for the use of PPE, contrary to NR-20.

51 gas stations were visited. Due to the General Law for the Protection of Personal Data (Law No. 13,709/2018), the names or addresses of the establishments visited will not be disclosed.

5 DISCUSSION

The analysis of the data showed important weaknesses in the use of Personal Protective Equipment among the gas station attendants evaluated. Although 2.6% of the participants reported using PPE in addition to the uniform (uniform), the absence of this equipment at the time of the approach suggests an inconsistent practice and possibly influenced by inadequate risk perception or lack of continuous availability of PPE. The lack of adequate PPE exposes workers to chemical and organic fumes, increasing the risk of serious diseases such as leukemias, neuropathies, and olfactory disorders (2,3).

Although 62.8% of the workers recognize the importance of PPE, the lack of supply and inspection contributes to the continuity of occupational exposure. This incoherence between the discourse and the observed practice points to the need for specific educational

interventions, reinforcing awareness about the chemical risks associated with working at gas stations and the real importance of the continuous and correct use of PPE.

The failure to systematically provide adequate equipment, combined with the absence of effective training and inspection policies, enhances the occupational vulnerability of this professional category. The use of the uniform alone, without complementation with the mandatory PPE, is insufficient to protect against exposure to benzene and other volatile chemical agents present in the environment.

The sociodemographic profile of gas station attendants reflects historical vulnerabilities: predominance of brown workers with average schooling, in line with what is described in RAIS data (9).

The support of the Union of Workers in Fuel and Petroleum Products Service Stations of the Federal District (SINPOSPETRO-DF) was fundamental for the success of the survey, especially to overcome the initial resistance of the workers, motivated by the fear of reprisals.

In addition, this work was supported by the Coordination for the Improvement of Higher Education Personnel (CAPES), which contributed with essential financial support to the realization of the research.

6 CONCLUSION

The survey showed severe failures in the use of PPE among gas station attendants in the Federal District, exposing them to avoidable risks. The absence of masks, gloves and other mandatory equipment aggravates the vulnerability of this category.

Recommendations:

- Implementation of mandatory PPE supply programs by employers.
- Continuous inspection by the competent authorities.
- Periodic training of workers in occupational safety.
- Mandatory installation of risk signs at gas stations.

It is essential to invest in protecting the health of gas station attendants to reduce morbidity and mortality related to exposure to benzene and other chemical agents.

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