



Effects on the health of workers in a poultry farm Efectos en la salud de los trabajadores de una avícola

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ABSTRACT

The objective of this research is to determine the effects on the respiratory health of workers in a poultry farm that provides private services in Ecuador. Methodologically, it was carried out under a descriptive quantitative approach. A significant association was observed between the position in the institution and the occurrence of respiratory diseases such as discomfort and nasal obstruction, showing a higher rate in the assistant poultry workers with 29%, poultry workers (16.1%), miscellaneous services (9.7%) and miller (3.2%). According to the results obtained, the low frequency of occurrence of symptoms of pulmonary and respiratory diseases, as well as other syndromes related to the respiratory system, were in agreement with the results of spirometry and chest X-rays, which showed no alterations in the poultry workers.

Descriptors: health education; safety education; food production. (Source: UNESCO Thesaurus).

RESUMEN

La investigación tiene objetivo determinar los efectos en la salud respiratoria de los trabajadores de una avícola que presta servicios privados en Ecuador. Metodológicamente fue realizado bajo un enfoque cuantitativo de tipo descriptivo. Se observó una asociación significativa entre el cargo en la institución y la ocurrencia de enfermedades respiratorias tales como molestias y obstrucción nasal, mostrándose un mayor índice en los ayudantes de galponero con un 29%, galponeros (16,1%), servicios varios (9,7%) y molinero (3,2%). De acuerdo con los resultados obtenidos en cuanto a la baja frecuencia de ocurrencia de los síntomas de enfermedades pulmonares, respiratorias, así como otros síndromes relacionados con el sistema respiratorio estuvieron en consonancia con los resultados de la espirometría y radiografías de tórax, las cuales no mostraron alteraciones en los trabajadores de la avícola.

Descriptorios: educación sanitaria; enseñanza de medidas de seguridad; producción alimentaria. (Fuente: Tesoro UNESCO).

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Research articles section



INTRODUCTION

Poultry farming in Ecuador has grown during the last decades (Palma-Avellán, & Sabando-Mendoza, 2023), but information on the impact of occupational exposure to organic dust on the respiratory health of workers is scarce (Rojas-Viteri, & García-Prieto, 2015). This activity includes permanent labor, which generates a large amount of particulate matter (PM10 and PM2.5) that constitutes an important risk in the occurrence of acute or chronic respiratory, dermatological and ocular problems. In poultry production units, the poultry worker is a worker who can be flexible, adaptable and constantly learning the development of poultry breeding (Souza, & Alexandre, 2012), and who is exposed to occupational hazards due, among other causes, to the fact that there is little rotation in their workplaces, which translates into a danger in the development of occupational diseases (Delpont, *et al.* 2021).

Broiler-type chicken farming has become the main poultry activity due to the fact that this type of poultry has a high fattening rate and good resistance to environmental conditions; however, in these activities there is constant exposure to risk factors throughout the process, such as variations in temperature and relative humidity, oxygen renewal and harmful gases, not only in the birds but also in the workers (Dos-Anjos-Magri, *et al.* 2021).

On the other hand; (Shen. *et al.*, 2018), determined that the air quality in the sheds inhabited by the birds is very varied, and depends a lot on the location, being higher its concentration of particulate matter of 10 micrometers (PM 10) in the morning in the rear and middle zones, while the front zone the air quality is acceptable. In addition, the presence of ammonia as a product of organic decomposition of feces should be considered. Exposure to the risk factors present in sheds can cause severe lesions in the upper respiratory system, generating long-term chronic effects on the respiratory tract, with recurrent respiratory symptoms, pulmonary diseases, among others.

It is important to highlight that complementary tests should be used in the evaluation of pulmonary problems. According to (Yasmeen *et al.* 2020), in a study conducted in Pakistan in poultry workers subjected to spirometry, they determined that 14% of the population studied had a medium pulmonary obstruction, with the oldest workers having the lowest lung capacity. The prevalence of farmer's lung disease ranged between 0.2-1.5%.

Based on the above, the objective is to determine the effects on the respiratory health of workers in a poultry farm that provides private services in Ecuador.

METHOD

The present study was conducted under a quantitative, observational, descriptive and cross-sectional approach; in which the effects of continuous exposure to particulate matter (organic dust) on health were evaluated in a poultry company that provides private services in Ecuador.

This company is made up of 4 farms, with a balanced production area and a dispatch area for which it has a total of 31 workers, who in total made up the study population.

The study included all the workers of the company because no non-occupational chronic disease had been diagnosed. All participants included in the study signed the informed consent form to guarantee their free will to participate, as well as the confidentiality of the information obtained.

The measurement of air quality was made based on the quantity and size of particulate matter (organic dust) from litter, feathers, poultry manure, using an air quality detection equipment (Mod. HT-9600). The measuring equipment for sample collection was placed in an open space to avoid blockage of the sensors and the measurement was taken after 50 s. The result of each measurement was expressed as a percentage of the total air quality. The result of each measurement was expressed in $\mu\text{g}/\text{m}^3$ of particulate matter. Samples were taken at the entrance and exit of the shed at three times during the working day (morning, noon and afternoon).

For the collection of information, a standardized epidemiological questionnaire of respiratory symptoms ATS-DLD-78-A (Orduz-García, *et al.*, 2013) was applied, which collects information on respiratory signs and symptoms that allow determining a diagnosis of respiratory disease in the



work area. Additionally, spirometry, standard chest X-ray and updating of occupational medical records were performed on each of the workers.

The commercial name of the poultry farm was kept anonymous, with the intention of maintaining their privacy, and the data collected were used only for scientific purposes.

Descriptive statistics and Pearson's Chi-square were applied, supported by the SPSS V25 statistical package, and are presented in the results section.

RESULTS

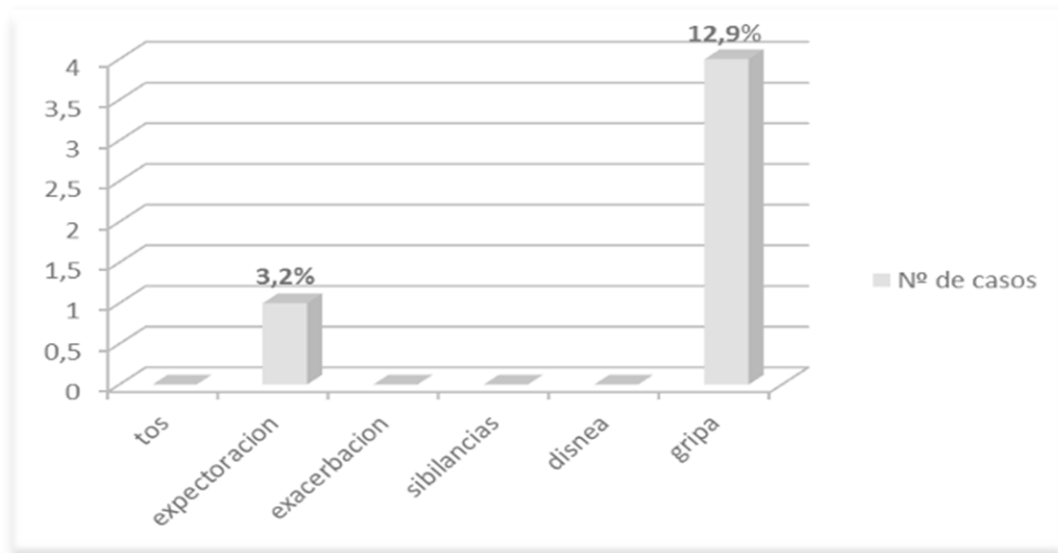
According to sociodemographic data, 74.2% of the workers are male, with an average age of 38.5 years and an average height of 1.6 meters. Regarding marital status, the highest percentage (58.1%) is married, followed by 25.8% in union, while a lower percentage of workers are single (9.7%), divorced (3.2%) and widowed (3.2%). In terms of educational level, 58.1% have primary education, 22.6% have university studies, 16.1% have secondary education and only 3.2% have a technologist's degree.

Similarly, there are certain processes that must be managed or headed by trained personnel because they are more specific. For example, 25.8% of the staff are warehouse workers, and they in turn have warehouse assistants who make up 29% of all employees.

Regarding the results obtained after the application of the standardized epidemiological questionnaire of respiratory symptoms ATS-DLD-78-A (Mohandas, et al. 2019), a very low or no occurrence of symptoms of cough, expectoration, exacerbation episodes, wheezing, dyspnea and common cold (influenza) was observed in the different workers of the poultry farm (graph 1). Of the total number of workers, only 1 case (3.2%) presented with expectoration and 4 cases (12.9%) with common cold, while the rest of the symptoms were not observed.

Graph 1.

Frequency of occurrence of different respiratory symptoms ATS 78 derived from continuous exposure to dusts in Poultry.



Source: Own elaboration.



Table 1. Frequency of occurrence of respiratory diseases in relation to the worker's age group.

	Grupo etario			Total	Chi cuadrado de Pearson
	<30	31-40	>40		
Si presenta alguno de los síntomas	3 (9,7%)	9 (29%)	6 (19,3%)	18 (58,1%)	0,227
No presenta ningún síntoma	2 (6,4%)	4 (12,9%)	7 (22,6%)	13 (41,9%)	--
Total	5 (16,2%)	13 (41,9%)	13 (41,9%)	31(100%)	

Source: Own elaboration.

Table 2. Frequency of occurrence of respiratory diseases in relation to the worker's age group.

	Grupo etario			Chi cuadrado de Pearson
	< 30 años	31-40 años	>41 años	
	3 (9,7%)	9 (29,0%)	6 (19,4%)	0,227
Molestias en una de sus fosas nasales				
Obstrucción nasal sin otros síntomas	3 (9,7%)	4 (12,9%)	3 (9,7%)	0,404
Rinorrea	0 (0%)	0 (0%)	0 (0%)	--
Disfagia	0 (0%)	0 (0%)	0 (0%)	--
Dolor en algún lugar de su cara	0 (0%)	0 (0%)	0 (0%)	--

Source: Own elaboration.

No significant association was detected with the age group of the workers; again, it is evident that there is a greater propensity of people older than 31 years to present this type of disease (Table 1), (Table 2).

Table 3. Frequency of occurrence of respiratory diseases in relation to the time spent in the workplace.

	Tiempo de permanencia en el trabajo (años)			Total	Chi cuadrado de Pearson
	1 – 5	> 6 -10	>10		
Si presenta alguno de los síntomas	8 (25,8%)	6 (19,3%)	4 (12,9%)	18 (58,1%)	0,813
No presenta ningún síntoma	7 (22,6%)	3 (9,7%)	3 (9,7%)	13 (41,9%)	--
Total	15 (48,3%)	9 (29%)	7 (22,6%)	31 (100%)	

Source: Own elaboration.



Table 4. Frequency of occurrence of respiratory diseases analyzed separately in relation to the time spent in the workplace.

	Tiempo de permanencia en el trabajo (años)			Chi cuadrado de Pearson
	1-5 años	>6-10 años	>10 años	
Molestias en una de sus fosas nasales	6 (19,3%)	8 (25,8%)	4 (12,9%)	0,813
Obstrucción nasal sin otros síntomas	3 (9,7%)	5 (16,1%)	2 (6,5%)	0,647
Rinorrea	0 (0%)	0 (0%)	0 (0%)	--
Disfagia	0 (0%)	0 (0%)	0 (0%)	--
Dolor en algún lugar de su cara	0 (0%)	0 (0%)	0 (0%)	--

Source: Own elaboration.

It was found that people with working time between 1-5 years and 6-10 years had the highest percentages of occurrence of respiratory disease (Table 3), (Table 4).

On the other hand, a significant association was observed between the position in the institution and the occurrence of respiratory illnesses such as nasal discomfort and obstruction, with a higher rate in the following positions: assistant storekeepers (29%), storekeepers (16.1%), miscellaneous services (9.7%) and miller (3.2%).

According to the results obtained, the low frequency of occurrence of symptoms of pulmonary and respiratory diseases, as well as other syndromes related to the respiratory system, were consistent with the results of spirometry and chest X-rays, which showed no alterations in the poultry workers. In addition, in the updated medical history, the workers did not report any type of acute or chronic pathology related to those described in the present study.

DISCUSSION

Activities that generate particulate matter (PM) in poultry production cause health problems in those exposed, whether at the ocular, respiratory or dermal level, and these pathologies can become chronic in workers. Particulate matter (PM) in poultry production units varies in size, density and composition, which can affect workers' health in different ways. This dust, which commonly originates from poultry waste, fungi and feathers, is biologically active in that it contains microorganisms that increase the risk of various respiratory diseases. In addition, this dust can combine with ammonia, a common contaminant in this type of poultry activity, and can cause acute or chronic respiratory diseases including chronic bronchitis, hypersensitivity pneumonitis, occupational asthma and toxin fever (Just, *et al.* 2009), (Huneau-Salaün, *et al.* 2019), (Wagner, *et al.* 2017).

In another order; (Hamid, *et al.*, 2018), showed a low prevalence of symptoms evidenced by 16.9 to 31% of workers who showed eye problems (tearing, redness and itching), while respiratory symptoms included wheezing due to colds or not (18, 3 and 1.4%, respectively), chest tightness (16.9%), shortness of breath together with chest tightness (9.9%), regular breathing difficulties (14.1%) and cough (15.5%), while 21% presented "obstructive" lung function.

Contrary to other studies, in the present article the most frequent respiratory symptoms found were nasal discomfort and obstruction, ocular pruritus, lacrimation and skin irritation. These symptoms completely subsided after the end of exposure, so it is presumed that these symptoms are due to the use of the protective and biosafety equipment used (Bedekelabou, *et al.* 2022). No chronic pathology such as cough, neoplastic effusions, superior vena cava syndrome or hypersensitivity pneumonitis, as reported in previous studies, was determined in any of the workers. Spirometry and chest X-rays performed on the workers in the present study yielded



normal results, unlike the results obtained by (Yasmeen, *et al.* 2019), who found 14% of workers with a pulmonary obstruction pattern.

CONCLUSION

A significant association was observed between the position in the institution and the occurrence of respiratory diseases such as nasal discomfort and obstruction, with a higher rate in the following positions: assistant storekeeper (29%), storekeeper (16.1%), miscellaneous services (9.7%) and miller (3.2%). According to the results obtained, the low frequency of occurrence of symptoms of pulmonary and respiratory diseases, as well as other syndromes related to the respiratory system, were consistent with the results of spirometry and chest X-rays, which showed no alterations in the poultry workers. In addition, in the updated medical history, the workers did not report any type of acute or chronic pathology related to those described in the present study.

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CONFLICT OF INTEREST

There is no conflict of interest with persons or institutions related to the research.

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