







# International Classification of the Pneumoconiosis Radiograph Reader Training in Turkey

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## Abstract

**OBJECTIVES:** We aimed to determine the characteristics of physicians who had attended the Readers Training of the International Labour Organization International Classification of Radiographs of Pneumoconioses (ILO ICRP) in Turkey.

**MATERIALS AND METHODS:** This study included 601 physicians attending the Reader Training of the ILO ICRP. Data were collected using an electronic questionnaire, and the inclusiveness of the study was 29.8% (n=179).

**RESULTS:** In this study, 70.6% of the physicians were men, and the mean age was 48.6±9.6 years; 46.6% of the participants had at least one medical specialty or side branch specialty, and 51.8% were pulmonologists. Furthermore, 52.6% of the physicians worked in the private sector, and 86.6% had an occupational physician certificate. Moreover, 55.3% of the participants evaluated the radiographs using the authority gained by the certification, and 68.3% of those who did not evaluate the films stated that the reason for not evaluating the films was a lack of demand. Participants who evaluated radiographs had received a demand for films most frequently from 1 to 2 different jobs (33.4%) and from 1 to 3 different workplaces (30.1%). Most films came from the mining (47.5%) and quarrying (50.5%) sectors. Some participants (64.3%) stated that the quality of the radiographs was insufficient, 59.2% experienced difficulties because the radiographs were not obtained using proper techniques, 23.4% stated that the fees per film evaluated were low, and 81.5% believed that update training is necessary.

**CONCLUSION:** The demand for these services will increase in line with the training and surveillance as stipulated by the legislation.

**KEYWORDS:** International classification of pneumoconiosis radiographs, Pneumoconiosis, Radiograph readers training

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## INTRODUCTION

In Turkey, the prevalence of dust-related occupational diseases generally ranks high among occupational diseases. According to data from the Social Security Institution published in 2016, 132,490 employees in 6821 workplaces in the mining sector and 1,887,099 employees in 195,990 workplaces in the construction sector were exposed to high concentrations of dust [1].

Pneumoconiosis is a term used to describe diseases caused by tissue reactions as a result of the accumulation of dust in the lungs [2], including occupational diseases such as coal worker pneumoconiosis, silicosis, asbestosis, siderosis, etc. [3]. Pneumoconiosis is considered an important disease, because of its preventable nature, insidious onset, long-latent period, progressive and irreversible prognosis, and lack of effective treatment. The prevention of dust exposure and the effectiveness of the diagnostic system are important in protection from this condition [4].

Radiological evaluation is made according to the classification of the International Labour Organization (ILO) for postero-anterior chest radiography [2]. The purpose of this classification is to encode radiographic findings of pneumoconiosis in a simple and reproducible way and to provide internationally comparable data for epidemiological studies. The classification of pneumoconiosis radiographs is included in the Guidelines for the use of the ILO International Classification of Radiographs of Pneumoconioses (ILO ICRP) [5]. However, it is important to emphasize that differences may occur in the evaluation of the films by different readers or in the evaluation of the films by the same reader at different times [6]. In the latest update in 2011, a section on the classification of films taken in the digital imaging method was added along with the analog imaging method [5].

The diagnostic process of pneumoconiosis in Turkey is carried out in accordance with the National Dust Control Directives and Regulations. The radiographs should comply with the standards specified in the ILO ICRP guidelines [7]. The

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evaluation of the radiographs taken is performed by at least two readers, and each of the readers independently evaluates the radiographs according to the specified guidelines.

In Turkey, reader training was administered by ILO in 1995. Since May 2009, this training has been organized by the Institute for Research and Development of Occupational Health and Safety (ISGUM) [4]. As of September 2018, 601 physicians have been certified after 25 training sessions.

The aim of this study was to determine the sociodemographic and working life characteristics of the physicians who had attended the Readers Training of the ILO ICRP in Turkey. Their opinions and recommendations were also recorded regarding the education they attained and their practices on the subject. We also aimed to contribute to increasing the efficiency of the trainings carried out by the ISGUM. In the long term, we also aim to contribute to determine occupational diseases and improve the employees' rights to work in a healthy and safe environment and to legislative arrangements regarding the solution of the difficulties encountered in workplaces and advice for future studies on the subject.

## MATERIALS AND METHODS

The research was planned for the purpose of the evaluation of the services carried out by the Turkish Ministry for Family, Labour and Social Services, Directorate General of Occupational Health and Safety. It was carried out in collaboration with the ISGUM and School of Medicine, Department of Public Health, Hacettepe University.

The population of this descriptive study included 601 physicians who participated in the ILO ICRP from May 1995 to September 2018 in Turkey. The data for this study were collected using an electronic questionnaire consisting of 29 questions. The link of the electronic questionnaire was sent on September 18, 2018, to the research group via email and text message, if the people did not have an email address. Two reminders were sent, and on October 19, 2018, the data collection process was terminated.

### Statistical Analysis

Data were analyzed by using the Statistical Package for Social Sciences version 23.0 (IBM SPSS Corp.; Armonk, NY, USA) statistical package program. Descriptive statistics were specified as number,

percentage, average, standard deviation, median, mode, minimum and maximum values, and first and third quartile values.

The study was carried out in accordance with the principles of the Declaration of Helsinki. Participation in the study was voluntary, and an informed consent form was used. The research process started in September 2018 and was finalized in December 2018.

## RESULTS

Of the 601 physicians who were certified, 179 participated in the study; the inclusiveness of the research was 29.8%. In terms of training dates and number of participants, the highest level of participation to the study was from those who were trained in December 18-22, 2017 (15 participants among 24 people, 62.5%).

More than two-third of the participants (70.6%) were men, the mean age was  $48.6 \pm 9.6$  years. A total of 34.3% of the participants graduated from the faculty of medicine 20-29 years ago (Table 1). Nearly half (46.6%) of them had expertise in at least one medical specialty or side branch. About half of these (51.8%) were specialists in chest diseases, 22.9% in radiology, 6.0% in public health, and 6.0% in occupational diseases.

More than half of the participants (52.6%) worked in the private sector. For the physicians who worked in more than one workplace, the longest working period was taken into consideration in the analysis of the results; 18.7% of the participants worked as full-time workplace physicians, 15.3% worked in private medical institutions, and 14.1% worked as workplace physicians in common health and safety centers. The majority (86.6%) of the participants had occupational physician certificates, and more than half (61.7%) are still active occupational physicians. In total, 78.6% of them worked as occupational physicians at some point in their life (Table 1).

Approximately half of the participants (55.3%) stated that they evaluated the radiographs. More than two-third (68.3%) of the participants who had not evaluated any radiographs stated that the reason for this was the lack of demand. When the number of radiographs evaluated was grouped, it was found that the most frequent (23.3%) number of radiographs evaluated was 101-500 films (mean $\pm$ SD:  $1430.5 \pm 1625.8$ ; median: 1000; mode: 1000) (Table 2).

Among the physicians who evaluated the radiographs, 45.9% received radiographs from applications directed to the institutions where they worked, 44.9% evaluated the radiographs obtained from the employees of the institution where they worked, and 44.9% received direct applications; 74.5% evaluated radiographs sent by private companies and 60.6% by common health and safety centers; in this question, more than one option could be selected. The source of the radiographs evaluated did not come from many different sectors or from a variety of workplaces, the most common (33.4%) were from 1 to 2 different sectors and from three different workplaces (30.1%) (Table 3).

On the basis of the distribution of the occupational sectors, the sectors that received the most radiographs and detected the most cases were mining and quarrying (47.5% and 50.5%, respectively) (Table 3). A total of 48.3% (n=86) of the physicians who participated in the study referred patients to

### MAIN POINTS

- In Turkey, the prevalence of dust-related occupational diseases generally ranks high among occupational diseases.
- The detection of the real level of exposure is important in terms of the determination of the rights and responsibilities, the planning of health services, and the economic burden on the health system.
- Radiological evaluation of pneumoconiosis is made according to the classification of the International Labour Organization (ILO) for posteroanterior chest radiography.
- So it is very important to determine the opinions and recommendations of the physicians who had attended the Readers Training of the ILO ICRP, about the education they attained and their practices on the subject.

**Table 1.** Distribution of the participants according to their sociodemographic features and their work as physicians (Ankara, 2018)

Feature	Subgroup	Number	Percent (%)
Age range (years) <sup>a</sup>	29-39	24	18.1
	40-49	46	34.6
	50-59	47	35.3
	60-73	16	12.0
	Total	133	100.0
Years since graduating from a Medical University <sup>b</sup>	3-9	9	5.3
	10-19	53	31.4
	20-29	58	34.3
	30-39	42	24.9
	40-49	7	4.1
	Total	169	100.0
Employment sector	Private	92	52.6
	Public	62	35.4
	Self-employed	15	8.6
	Public and private	6	3.4
	Total	175	100.0
Years since receipt of the occupational physician certificate <sup>c</sup>	1-9	62	50.4
	10-19	21	17.1
	20-30	40	32.5
	Total	123	100.0
Working situation as an occupational physician	Still working	95	61.7
	Worked in the past	26	16.9
	Never worked	33	21.4
	Total	154	100.0
Years of employment as an occupational physician <sup>d</sup>	1-9	73	60.8
	10-19	23	19.2
	20-29	22	18.3
	30-37	2	1.7
	Total	120	100.0

<sup>a</sup>Mean±SD: 48.6±9.6; Median: 49; Mode: 44; Min: 29; Max: 73; first quartile: 41; third quartile: 55.5.

<sup>b</sup>Mean±SD: 23.7±9.5; Median: 24; Mode: 19; Min: 3; Max: 49; first quartile: 16; third quartile: 31.

<sup>c</sup>Mean±SD: 12.7±8.5; Median: 9; Mode: 6; Min: 1; Max: 30; first quartile: 5; third quartile: 20.

<sup>d</sup>Mean±SD: 10.0±8.2; Median: 7; Mode: 5; Min: 1; Max: 37; first quartile: 4; third quartile: 15.

an authorized hospital to prepare a file based on occupational disease diagnosis (42.0% of the physicians referred to 1-9 patients, 18.5% to 10-19 patients, and 16.0% to 20-29 patients; mean±SD: 40.2±130.8; median: 10; mode: 5; minimum: 1; maximum: 1000; first quartile: 5; third quartile: 26).

Related to the difficulties encountered during the film evaluation process by the participants who evaluated the films, two out of three physicians (64.3%, 63 people) had low-quality films, more than half (59.2%, 58 people) had films that were not taken with the proper techniques, and one of four physicians (23.4%, 23 people) stated that the wages for evaluation were low; 13.2% (13 people) stated that they did not encounter any difficulties in this process.

Regarding the evaluation of the training administered by the IS-GUM, for the statement, "The training I attended was sufficient for the knowledge and skills that I would use/use in practice," 19.8%

of the participants said that they strongly agree with the statement; 55.9%, agree; 8.5%, did not agree; 2.8%, did not agree at all; and 13.0%, had no idea. The majority (81.5%, 145 people) stated that the training required updating. More than half (57.2%) stated that these trainings should be given in every 5 years, 18.8% in every 3 years, 8.7% in every 2 years (mean±SD: 4.3±1.8; mode: 5; minimum: 1; maximum: 10; first quartile: 3; third quartile: 5); 35.2% of them said that the updating training period should be 2 days, 31.7%, 3 days, 18.3%, 5 days (mean±SD: 3.6±3.3; median: 3; mod: 2; minimum: 1; maximum: 30; first quartile: 2; third quartile: 5). Almost all participants (97.1%, 169 people) stated that digital film evaluation should be integrated into the trainings.

## DISCUSSION

Employees' right to work in a healthy and safe environment and the obligation of employers to provide this are legal rights

**Table 2.** Distribution of the features of the participants evaluating the films (Ankara, 2018)

Feature	Subgroup	Number	Percent (%)
Reason for not evaluating films	Lack of demand	54	68.3
	Insufficient wages	11	13.9
	Feeling unqualified	6	7.6
	Prefer not to evaluate	4	5.1
	Other <sup>a</sup>	4	5.1
	Total	79	100.0
Number of films evaluated <sup>b</sup>	1-100	12	13.3
	101-500	20	23.3
	501-1000	13	14.4
	1001-2000	12	13.3
	2001-7000	15	16.7
	More than 7000	18	20.0
	Total	90	100.0
Number of films evaluated <sup>c</sup>	0	80	44.7
	1-100	12	6.7
	101-500	20	11.2
	501-1000	13	7.2
	1001-2000	12	6.7
	2001-7000	15	8.4
	More than 7000	18	10.1
	Evaluated film but not stated the number	9	5.0
	Total	179	100.0

<sup>a</sup>Other: "I do not think you can have enough experience after one course and more than one person should evaluate the films together" (1 person); "There is no clear regulation on how public employees are to provide this service, I am rejecting requests to avoid any legal distress" (1 person); "I think blind reading is necessary" (1 person); "I do not evaluate films because there are authorized expert reviewers" (1 person).

<sup>b</sup>Mean±SD: 1430.5±1625.8; Median: 1000; Mode: 1000; Min: 2; Max: 200; first quartile: 200; third quartile: 2000 (18 people who responded "more than 7000" to the question regarding the number of films they evaluated were excluded from the analysis while calculating the mean, standard deviation, median, and peak).

<sup>c</sup>Mean±SD: 677.6±1325.3; Median: 0; Mode: 0; Min.: 0; Max.: 7000; first quartile: 0; third quartile: 787.5 (responses given for the number of radiographs evaluated, containing numerical values more than 7000 (18 people), "Too many," "dozens," etc. (5 people) and participants who did not state the number of films evaluated (4 people) were not included in the analysis when calculating the mean, standard deviation, median, and mode).

and obligations stated in the international regulations and national legislation. In our country, as in many other countries, occupational disease diagnosis, registration, and notification are problematic issues. However, the detection of the real level of exposure is important in terms of the determination of the rights and responsibilities, the planning of health services, and the economic burden on the health system.

Pneumoconiosis is one of the most common/detected and preventable occupational diseases in our country [3]. The aim should be to prevent pneumoconiosis, which can be achieved through effective protection and prevention. When the disease occurs, the first step of the diagnosis is the evaluation of the chest radiographs of the employees [8]. A classification system has been established by the ILO to systematically identify and record radiographic anomalies caused by the inhalation of industrial dust [5, 9]. This classification system was first presented in 1930 at the International Conference on Silicosis, and this system is currently used at an international level [10]. It is also applied in our country [2]. The participation level (29.8%) in this research, which is carried by the ISGUM and

which is open to all physicians, was not at the expected level, but it should be taken into consideration that this frequency is generally 10%-15% in electronic survey applications.

#### International Labour Organization Readers

It is noteworthy that more than two-third (70.6%) of the physicians participating in this research were men and that the average age was 48.6±9.6 years. The distribution of the participants according to the sector they work in showed that nearly two-third (61.2%) were in the private sector, and 3.4% worked in both the public and private sectors. According to the ISGUM records regarding all ILO readers, 49% of them worked in the public sector and 51% of them worked in the private sector [4]. This difference could be due to the level of participation in this research.

In another study that was carried out to determine the need for advanced professional training of occupational physicians, it was determined that one of five (19.3%) participants wanted to take advanced training in the evaluation of chest radiographs [11]. Applications for the ILO ICRP Reader Train-

**Table 3.** Distribution of the features of the films evaluated by the participants (Ankara, 2018)

Feature	Subgroup	Number	Percent*	Percent**
Number of workplaces where the films were received <sup>a</sup>	1-3	25	30.1	
	4-6	16	19.3	
	7-15	18	21.7	
	16-50	14	16.9	
	More than 50	10	12.0	
	Total	83	100.0	
Number of sectors where the films were received from <sup>b</sup>	1-2	28	33.4	
	3-4	18	21.4	
	5-6	18	21.4	
	7-10	11	13.1	
	More than 10	9	10.7	
	Total	84	100.0	
Method of the delivery of the films to the reader <sup>c</sup>	Applications to the institution where they worked	45	45.9	33.8
	Films made by the employees of the institution where they work	44	44.9	33.1
	Direct applications to themselves	44	44.9	33.1
	Total	133	-	100.0
Institutions sending the films <sup>c</sup>	Private companies	70	74.5	42.9
	Common health and safety centers	57	60.6	35.0
	Public institutions	22	23.4	13.5
	Hospitals	14	14.9	8.6
	Total	163	-	100.0
Sectors from which the most films were evaluated	Mining and quarrying	46	47.5	
	Manufacturing industry	34	35.1	
	Construction and public works	13	13.4	
	Other***	4	4.0	
	Total	97	100.0	
Sectors from which the most cases were detected	Mining and quarrying	48	50.5	
	Manufacturing industry	27	28.4	
	Construction and public works	9	9.5	
	I did not detect any cases	11	11.6	
	Total	95	100.0	

\*In terms of number of persons \*\*In terms of number of answers \*\*\*Other: Electricity, gas, and water (1 person), financial services, insurance, real estate business and auxiliary services (1 person), community services, social and personal services (1 person), wholesale and retail trade, restaurants and hotels (1 person)

<sup>a</sup>Mean±SD: 22.6±40.6; Median: 8; Mode: 1; Min: 1; Max: 200; first quartile: 3; third quartile: 20.

<sup>b</sup>Mean±SD: 5.7±6.9; Median: 3; Mode: 3; Min: 1; Max: 40; first quartile: 2; third quartile: 6.

<sup>c</sup>More than one answer could be given to the related question.

ing are completed in a short time following the publication of the announcement. This situation results from the desire to obtain more information and because it is an income-generating and skill-enhancing training as well.

Nearly half of the participants (46.6%) had at least one medical specialty or side branch specialty. The first three areas of expertise were chest diseases, radiology, and public health. In a study that included all the participants from the ISGUM records, the first three specialties were chest diseases, radiology, and internal diseases [4].

The majority of the participants (86.6%) had occupational physician certificates. Half of them (50.4%) received their certificate 10 years ago or less, and three-fifth (61.7%) are still working as occupational physicians. According to the information obtained from the Occupational Health and Safety Information Management System, 16,426 (51.9%) of 31,632 physicians who had occupational physician certificates still work as occupational physicians (12). Those who actively work as occupational physicians are more interested in training; 16.9% of participants had worked as occupational physicians. In terms of motivation to participate in the education of pneumoconio-



sis, the participants may have attended the training to meet the reader needs of the workplaces they serve.

### Service Deliver-Film Evaluation

Considering the number of dusty workplaces and the number of employees in these areas, the number of workplaces reached and the number of evaluated films are very limited. At least 200,000 workplaces and 2 million employees comprise the mining and construction sectors (1). In addition, new sectors have also been added to these sectors. According to the statistics between 2013 and 2016, silicosis is the primary reason for the increasing trend of pneumoconiosis when compared with asbestos and coal worker pneumoconiosis. In addition to traditional sources, silicosis also occurs in new sources such as denim sandblasting [13]. Three out of ten participants evaluating films received films from three or fewer different workplaces, and readers who evaluate films from over 50 different workplaces were only 12.0% of participants. The total number of workplaces and employees covered is limited. However, in workplaces where employees may have been exposed to dust due to their work, the screening and evaluation of lung radiographs in accordance with the ILO IPRC is mandated by the Dust Fighting Regulation.

When in doubt or a case of a pneumoconiosis detected by readers is reported to the employer, the involved employees should be referred to authorized hospitals for the diagnosis of occupational diseases [2]. Approximately half of the participants (48.3%) referred patients to authorized hospitals for the diagnosis of occupational diseases. The median number of patients referred was 10 persons. Certification training for pneumoconiosis reading will contribute to studies on the diagnosis, recording, and notification of occupational diseases.

Nearly half of the participants (44.7%) did not evaluate any film after completing their certificate training on pneumoconiosis. Considering that film evaluators may prefer to participate in the research, it can be estimated that the frequency of those who do not evaluate films is higher. More than two-third of these physicians stated that the most important reason for not reading the film was "the lack of demand." This was followed by "not having enough self-sufficiency" and "finding the wages insufficient."

The median number of different sectors where the evaluated films came from was 3. The three most prominent sectors were mining and quarrying, the manufacturing industry, and construction and public works. The case distribution of the sectors was similar. In a study conducted in Japan, dusty jobs were listed in 24 titles, and most of the listed jobs were covered by sectors identified in this study [14].

The most common difficulties related to film evaluation were related to the quality and shooting technique. Film quality is an important problem that needs improvement. Another problem that has been reported in this regard is related to film evaluation fees (eg, insufficient wages, lack of standard fees). Other difficulties, which include deciding on the classification, the availability of films, appropriate environment for film evaluation, and difficulties of providing a suitable monitor, were reported at a relatively low level. The Guidelines for the use of ILO International Classification emphasize the

importance of radiography quality for the correct interpretation of chest radiographs. Shooting radiographs that clearly show both the parenchyma and pleura is important. Inadequate films (class 4) in terms of technical quality for classification purposes should not be used. The technique and equipment used to display chest radiographs directly affect the radiographic appearance and thus the classification of pneumoconiotic lesions [5]. In other studies on the reading of pneumoconiosis, the importance of film quality and suitability of the technique were emphasized [15-17]. In a study in which chest radiographs of 400 workers in a factory producing glass ducts were evaluated according to technical and quality standards, it was found that almost 50% of the films had insufficient technical quality and exposure doses [18].

### Content of Training and Updating Training

In this study, 19.8% of the participants stated that they strongly agree that "the training I attended was sufficient for the knowledge and skills that I would use/use in practice" and 55.9% of them agree with that. Among the reasons for not evaluating the film, six respondents stated that their concern was "not feeling sufficient."

Education is a process, and its continuity is important. Advanced vocational training, which is held at regular periods, ensures that the information is remembered and professional information is maintained up-to-date [11]. "A Review of the Educational Programs of OHS Professionals in Turkey" report published by the ILO Turkey Office mentioned the importance of continuing education and the necessity of legislation for updating training to ensure the sustainability of the training as emphasized in the "Sustainability and Life-Learning" chapter [11, 19]. The National Institute of Occupational Safety and Health started refresher courses for certificates of B class readers in 1984 because several studies have shown that the film-reading skills of readers who do not frequently review films decrease over time. Recertification is required every 4 years to maintain the validity of the certification [10, 20].

In this study, 43.3% of the participants were trained in the last year and 24.4% were trained over 5 years ago. The majority of the research groups (81.5%, 145 people) thought that updating training is required. More than half of them (57.2%) stated that the trainings should be done every 5 years. The median of the recommended training period is 3 days. Although it is thought that the legislative changes and developments in film shooting techniques may be the reason for the need to update the training, the decrease in knowledge and skill over time play a significant role. There are differences between readers in the classification of lung films [21, 22]. In addition to basic education, updating trainings will contribute to a reduction of these differences.

The integration of digital film evaluation into the training was recommended by almost all of the participants (97.1%). In the literature, there are various studies reviewing the validity and reliability of digital films and those comparing the use of analog/digital films or hard copies/computerized copies for the detection of silicosis and other pneumoconiosis cases [23-26]. The inclusion of digital chest x-ray images in the ILO guide mandates the necessity of updating trainings, which take into account digital film evaluations [5].

The number of workplaces and employees served by the participants was very limited. As in many areas of occupational health and safety and occupational diseases, awareness studies on prevention, rights, obligations, and health surveillance should also be administered in the field of pneumoconiosis. Awareness trainings should be carried out for employees, employers, and workplace physicians in the prioritized sectors. Thus, it will be possible to strengthen the processes associated with shooting and evaluating lung radiographs of those working in dusty conditions, as stipulated by the legislation. The sectors that require these services the most should be supported within the scope of the public services.

The number of certified physicians required to meet the existing needs and demands throughout the country should be planned considering the level of occupational health and safety level, international practices, country facts, and the fact that approximately half of the trained readers do not evaluate films after training; long-term arrangements should be made at the regional level in consideration of the distribution of the prioritized sectors.

To further improve the ability of continued training and to provide the necessary knowledge and skills, the content, method, and success criteria should be reviewed and regulated. The vast majority of respondents emphasized the need for updating training. Updating training should be planned after basic training and should not be neglected. It is clear that active reading is necessary to maintain the acquired skills. In the planning stage of updating trainings, the needs should be analyzed for content, duration, etc, and international practices and the literature should be taken into consideration. In the training courses, special topics for specific sectors and specialization areas of the participants or the occupational physicians should be considered.

There is a need for planning related to film evaluation, prioritizing a balanced distribution, including improving film quality, providing proper film shooting with appropriate techniques, and setting standard wages. These results should be considered by policy makers and arrangements should be made. In this context, the number of registered or unregistered employees and the working conditions should be taken into consideration, especially in dusty businesses. Otherwise, the number of certified physicians in the free market may affect service quality. However, this doubt should not hamper training aimed at a sufficient number of physicians.

Standardization is also important, the lack of which can lead to diagnostic and economic issues. The most common difficulties encountered by participants during film reading were related to the film quality and shooting technique. It is necessary to develop standards for these elements. These standards should be included in the legislation and disseminated in accreditation studies. Training for radiology technicians should be organized, and cooperation with vocational education institutions should be initiated.

Service surveys and impact assessment studies should be conducted to guide the planning and implementation of the legislative arrangements.

**Ethics Committee Approval:** This research is the study conducted by ISGUM to report its own activities. Therefore, permission was obtained from ISGUM authorities.

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## REFERENCES

1. Statistical Yearbook of Social Security Institution 2017, (cited 2018 October 17). Available from: [http://www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk\\_istatistik\\_yilliklari](http://www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk_istatistik_yilliklari).
2. Dust Cost Regulation, OG Date: 05.11.2013 OG Number: 28812 (cited 2018 October 17). Available from: <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.18989&MevzuatIsmi=0>.
3. Yıldız AN, Sandal A (Editors) Occupational Diseases Work Related Diseases (Selected Topics), Hacettepe University Publications, s. 165-174, Ankara, 2018.
4. Şimşek KA, Ovacılı S, Atacan SE, et al. Evaluation of the International Classification of ILO Pneumoconiosis Radiograph Reader Training, Poster presentation, 9. International Congress on Occupational Safety and Health, İstanbul, 2018. [Crossref]
5. Guidelines for the Use of the ILO International Classification of Radiographs of Pneumoconioses (Revised Print, 2011). Directorate General of Occupational Health and Safety, Occupational Health and Safety Series 22, 2018.
6. Kalaycı D. Standards for Classification of Pneumoconiosis Radiographs and Situation in Turkey. Poster presentation, Occupational Diseases Congress, İzmir, 2018.P4.
7. Communiqué on Applications Regarding Dust Control, (cited 2018 October 17). Available from: URL:<http://www.resmigazete.gov.tr/eskiler/2014/10/20141002-15.htm>.
8. National Action Plan for the Prevention of Pneumoconioses, (cited 2018 October 17). Available from: [https://www.csgb.gov.tr/media/6712/ulusal\\_pnomokonyoz\\_oep.pdf](https://www.csgb.gov.tr/media/6712/ulusal_pnomokonyoz_oep.pdf).
9. Kongar, N.A. Radiological Evaluation in Occupational Lung Diseases. Klinik Gelişim 2010;4:11-9.
10. ILO International Classifications of Radiographs of Pneumoconioses - Past, Present and Future - Yutaka Hosoda Consultant, Radiation Effects Research Foundation, Hijiyama Park 5-2, Minami-ku, Hiroshima, 732-0815, Japan, (cited 2018 December 26). Available from: URL:<http://eknygos.ismuni.lt/springer/229/57-70.pdf>.
11. Gökgöz G, Uyar RE, Yıldız AN. Further Vocational Training Needs of Workplace Doctors Research Report, Ministry of Family, Labor and Social Services, Directorate General of Occupational Health and Safety, 2018.
12. Occupational Health and Safety Information Management System, (cited 2018 November 2). Available from: URL:<https://ibys.csgb.gov.tr>.

13. Akgün M, Ergan B. Silicosis in Turkey: Is It an Endless Nightmare or Is There Still Hope? *Turk Thorac J* 2018;19:89-93. [\[Crossref\]](#)
14. JP NA, Imanaka M, Sagunuma N. Japanese workplace health management in pneumoconiosis prevention. *J Occup Health* 2017;59:91-103. [\[Crossref\]](#)
15. Falaschi F, Battolla L, Paolicchi A, et al. High-resolution computed tomography compared with the thoracic radiogram and respiratory function tests in assessing workers exposed to silica. *La Radiologia Medica* 1995;89:424-9.
16. Tamura T, Suganuma N, Hering KG, et al. Relationships (I) of International Classification of High resolution Computed Tomography for Occupational and Environmental Respiratory Diseases with the ILO International Classification of Radiographs of Pneumoconioses for parenchymal abnormalities. *Industrial Health* 2015;53:260-70. [\[Crossref\]](#)
17. Şener MU, Şimşek C, Özkara Ş, et al. Comparison of the International Classification of High-resolution Computed Tomography for Occupational and Environmental Respiratory Diseases with the International Labour Organization International Classification of Radiographs of Pneumoconiosis. *Ind Health* 2019;57:495-502. [\[Crossref\]](#)
18. Binay S, Arpak P, Safak Alper A, et al. Does periodic lung screening of films meets standards? *Pak J Med Sci* 2016; 32(6):1506-11. [\[Crossref\]](#)
19. Önal B. (Cooperation with the ILO Office in Turkey). Review of the Training Programs of OHS Professionals, Final Report. Ankara: 2017.
20. The NIOSH B Reader Program, (cited 2018 November 16). Available from: URL: <https://www.cdc.gov/niosh/topics/chestradiography/breader.html>.
21. Tamura T, Kusaka Y, Suganuma N, et al. Assessment of physicians' proficiency in reading chest radiographs for pneumoconiosis, based on a 60-film examination set with two factors constituting eight indices. *Ind Health* 2018;56:382-93. [\[Crossref\]](#)
22. Zhou H, Kusaka Y, Tamura T, et al. Proficiency in Reading Pneumoconiosis Radiographs Examined by the 60-film Set with 4-factor Structuring 8-index. *Ind Health* 2012;50:142-6. [\[Crossref\]](#)
23. Franzblau A, teWaterNaude J, Sen A, et al. Comparison of digital and film chest radiography for detection and medical surveillance of silicosis in a setting with a high burden of tuberculosis. *Am J Ind Med* 2018;61:229-38. [\[Crossref\]](#)
24. Lee WJ, Choi BS. Reliability and validity of soft copy images based on flat-panel detector in pneumoconiosis classification: comparison with the analog radiographs. *Acad Radiol* 2013;20:746-51. [\[Crossref\]](#)
25. Larson TC, Holiday DB, Antao VC, et al. Comparison of digital with film radiographs for the classification of pneumoconiotic pleural abnormalities. *Acad Radiol* 2012;19:131-40. [\[Crossref\]](#)
26. Sen A, Lee SY, Gillespie BW, et al. Comparing film and digital radiographs for reliability of pneumoconiosis classifications: a modeling approach. *Acad Radiol* 2010,17:511-9. [\[Crossref\]](#)