令和５年度 労災疾病臨床研究事業

総括・分担研究報告書

健康管理手帳制度による健康診断の諸外国での実施のための研究

研究代表者

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令和 5 年度労災疾病臨床研究事業費補助金研究　総括研究報告書

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研究要旨

【目的】

日本の健康管理手帳制度は労働者が特定の有害業務に従事した場合や健康被害を受けた場合に、退職後も無料で健康診断を受けられる制度である。健康管理手帳制度は日本国籍だけでなく外国人も対象となるが、外国人労働者の増加に伴い、帰国後の健康管理が重要となっている。特に、ベトナム、中国、フィリピン、インドネシアなどで技能実習生が多いため、これらの国を中心に健康診断の方法や健康管理手帳制度での健康診断を実施可能な医療機関を調査し、解決策を提案する。

【方法】

本年度は研究計画書の作成、調査対象国の選定、アンケート調査票の開発を行う。各国の健康診断制度等について、文献調査や関係機関訪問、オンライン会議にて収集する。

【結果】

調査対象国として技能実習生の来日状況を元にタイ、インドネシア、ベトナム、フィリピンを選定した。タイでは、研究代表者らがタイを中心に活動してきたアジアじん肺読影医養成プログラム（AIR Pneumo）の協力体制を活かし、労働安全衛生の専門家を招いて情報交換の会議を開催した。インドネシアでは、研究協力者らとインドネシア大学医学部産業医学部門との協力体制を活かし、研究班で作成したアンケート調査票（英文）を用いて、インドネシア国内での労働安全衛生活動に関する予備調査を行った。ベトナム、ネパールでは、OSH サービスの提供システムや品質保証システムに関して文献調査し、特にネパールでは健康診断実施病院リストも収集した。タイ、ベトナム、フィリピンでは、政府機関等から協力依頼状等が求められた。また、米国の大学を訪問し、移民労働者の退職後の健康管理について調査した。さらに、AIR Pneumo に参加したじん肺読影医の分布状況や認定試験の傾向を報告した。

【考察】

本年度の調査により、ベトナム等のアジア諸国に、健康管理手帳による健康診断を実施可能な医療機関の存在することが示唆されたが、詳細情報は不足している。引き続き、

これらの国々の医療体制や設備、読影医の水準についてより詳細な調査が必要である。

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A. 研究目的

本研究の目的は、我が国の有害業務を行う職場で有害化学物質等に曝露した外国人労働者がその職場を退職した際に、健康管理手帳交付対象であった場合に継続した健康診断を実施可能なのか、について、各国の状況を明らかにするところである。すなわち、健康管理手帳制度による健康診断を諸外国で実施するため、受診者数の規模や諸外国での健康診断実施状況を踏まえ、実施方法に関する課題及び解決策を検討する。

がんその他の重度の健康障害を生ずるおそれのある業務に従事していた者で一定の要件に該当する者については、離職の際又は離職の後に、労働安全衛生法の規定に基づき、都道府県労働局長から健康管理手帳の交付を受け、その都道府県労働局長が指定する医療機関において、定期的に健康診断を受診することができることとなっている。これは、単に日本国籍を有する労働者だけではなく、我が国で就労する外国人労働者も対象となる。（我が国で就労する労働者も対象となり、「特定技能」制度の導入に当たり、平成 31 年 3 月 28 日に発出された厚生労働省労働基準局長通達「外国人労働者に対する安全衛生教育の推進等について」においても、外国人労働者の離職時には健康管理手帳の交付について必要な説明を行うことが示されている。）

我が国で働く外国人労働者は、令和元年には約 166 万人いると言われている（法務省調べ）が、長期間我が国で働く人々だけでなく、このうち約 23%（約 38.4 万人）を占める技能実習生は、最大 5 年間の我が国滞在の後は母国に帰国することとなる。

健康管理手帳の交付対象となる業務は、当該業務を行わなくなった後であっても健康影響が発生するおそれのある業務であることから、帰国した後も継続的な健康診断の受診が必要となるが、健康管理手帳により健康診断を受診できる機関は、都道府県労働局長から指定される当該都道府県内の機関に限られているため、現行制度においては、仮にこのような外国人労働者が母国に帰国した場合には、母国においては健康管理手帳による健康診断は受診できないこととなる。

2019 年に施行された改正出入国・難民認定法により、段階的に単純労働分野においても外国人労働者の受け入れを拡大することとなっており、今後、一定期間我が国で有害業務に従事した後、母国において健康診断の受診を希望する者が増加することが予想される。

このようなことを背景として、現在多くの技能実習生が来日しているベトナム、中国、フィリピン、インドネシアを中心に、技能実習に関する二国間取り決めを行っている国々（主として東南アジア諸国）のうち主要な国等を対象として、健康管理手帳制度に基づく健康診断を行う適切な医療機関等の把握、健康診断の実施方法・課題等について、海外の関係機関と連携して調査を行い、外国人労働者が母国に帰国した後の健康診断を通じた健康管理の方法について解決法や提案を行うことを目的とする。

B. 研究方法

（1）調査対象国の検討

健康管理手帳の交付対象状況や今後の予想等を踏まえ、調査対象国を検討する。検討に当たっては、現在多くの技能実習生が来日しているベトナム、中国、フィリピン、インドネシアや、技能実習や特定技能に関する二国間取り決めを行っている国々のうち主要な国等を対象にすることを想定している。

（2）基礎的情報の収集・整理

対象国・地域の健康診断に関連する制度や現状等の基礎的な情報について、文献調査や関係機関訪問等により、把握する。なお、オンライン会議を適宜活用して情報収集を促進する。

（3）国際会議の準備

主に東南アジア（タイ、ベトナム、ミャンマー、インドネシア、フィリピン、ラオス、カンボジア等）を対象に、令和 6 年度及び 7 年度に国際会議により詳細な情報を収集することを検討する。

C. 研究結果

アジア諸国の実情把握においては、技能実習生の来日状況をもとにベトナム、フィリピン、インドネシア、タイを対象国家として選定した。また、対象とする健康診断については、健康管理手帳交付状況を踏まえ、粉じん作業、石綿等業務に関する健康手帳による健康診断を対象とすることとした。各国における調査実施のための研究計画書を作成し、情報収集のための質問票を開発した。

タイでの調査進捗状況について、研究代表者らのチームが、2008 年以来、タイで 7 回実施してきたアジアじん肺読影医養成プログラム（AIR Pneumo）の中で形成されたネットワークを活用するべくタイを訪問し、労働安全衛生（OSH）分野の専門家を招いて情報交換のための会議を開催した。会議の中で、アンケート調査に関しては倫理委員会（IRB）の承認が必要となるが、IRB 承認に 8 ヶ月以上の時間を要するため、IRB の承認が不要なフォーカスグループインタビューにて情報収集するのが良い、という意見を得た。

インドネシアでの調査進捗状況について、研究協力者らのチームが、2010 年以来実施してきた、日経企業の海外事業場における労働安全衛生活動のサービスの質の向上を目的とした様々な取り組みを通じて形成してきたインドネシア大学医学部産業医学部門との協力体制を活かし、研究班で作成した現地国へのアンケート調査票（英文）を用いて、インドネシア国内での労働安全衛生活動(特にじん肺に対する特殊健康診断の実施体制並びに医療機関の有無など)に関する予備調査を行った。予備調査の結果より、インドネシア国内においては、本研究の目的を果たすために必要となる一定の人材や医療設備並びに医療機関の存在の可能性が示唆された。ただし、現地国内で具体的に本取り組みを進める際には、より詳しい情報の入手が必要と思われた。

ベトナムでの調査進捗状況について、ベトナム保健省保健環境管理局での労働安全衛生行政の実務担当者との会議、及び文献調査を通じて、OSH サービスの提供システム及び品質保証システムについての情報を収集した。OSH サービスの提供システムについて、管轄部署は労働・傷病兵・社会問題省（MOLISA）と保健省（MOH）で、2015 年に OSH 法が制定された。品質保証について、各病院は品質保証システムを導入する義務があり、医療従事者は 2 年ごとに継続教育を受ける必要がある。産業医専門の養成機関はなく、資格取得のためには 3 年以上の臨床経験に加え、NIOEH での 3ヶ月間の研修コース修了ないしハノイ医科大学での 9 ヶ月間の特別指導コース修了が求められる。

フィリピンでの調査進捗状況について、フィリピンで労働安全衛生行政を主管する労働雇用局の労働安全衛生センターの専門家とのオンラインMTGにおいて、フィリピンの医療施設の有無や日本との制度の違いが議論され、プロジェクトは他国展開の段階にあると報告された。フィリピン側の参画には組織間協定が必要であり、労働衛生団体連合会や高知大学との協定が提案された。引き続き、研究計画書の改訂やコミュニケーションの必要性が議論された。

ネパールでの調査進捗状況について、文献調査を通じて、OSH サービスの提供システム等についての情報を収集した。ネパールの医療制度は連邦、州、地方の 3 層構造で、保健・人口省（MOHP）の下に連邦レベルの保健局があるが、OSH 制度との連携が不十分である。また、職業性疾患の専門的な管理機関は存在しない。OSH 制度の最高機関は労働・雇用・社会保障省（MoLESS）であるが、OSH はその優先事項として扱われてい

ない。そのため、OSH の管理体制が脆弱で、人材不足が深刻な状況である。入国前のメディカルチェックを認可された医療機関はあり、本調査を通じて 284 院をリストアップした。しかし、海外就労から帰国した労働者の健康ニーズに対応する機能的なシステムはない。

また、先進国での移民労働者の帰国後のフォローアップの事例収集をするべく、米国の大学２校（UCSF, University of Arizona）を訪問した。UCSF では、米国の労災補償について遅れがあり、州ごとの法律により情報が散在している状況が説明された。アスベストやシリカ曝露に関する補償体制の整備が不十分であり、退役軍人や多国籍企業の労働者に対する補償も課題となっている。また、University of Arizona では、ベリリウム曝露や炭鉱労働者の補償率の低さ、新たなシステムの導入による情報収集の試みが述べられた。さらに、異なる国での調査実施に際しての課題と助言も示された。

本事業では、粉じん作業、石綿等業務に関する健康手帳による健康診断に焦点を絞って調査を進めている。これらの業務の関連疾患であるじん肺に関して、調査対象国において、診断・治療に関して一定の技術レベルに達していると思われる読影医の分布状況については、先述の AIR Pneumo に関する研究報告（J-P, 2024）が参考になる。この報告を最新情報に更新すると、2008 年からこれまでに 26 回の認定試験を行い、20 カ国から 674 人の医師が認定試験に参加している。参加者の６割はインドネシア、タイの医師であった。合格者、不合格者の傾向を調べたところ、前者は小空孔の同定において偽陽性が多く、後者は病変同定において偽陽性率が高い傾向が見られた。

D. 考察

ベトナムやインドネシア、ネパールなどのアジア諸国での調査により、健康管理手帳による健康診断を実施可能な医療機関が各国に存在することが示唆された。しかし、これらの国々の医療体制の現状や医療機関の能力については、まだ詳細な情報が不足している。今後、これらの国々における医療機関の設備や人材の水準、健康診断の提供範囲などについて、より詳細な情報を収集する必要がある。特に、移民労働者が帰国後に適切な健康管理を受けるためには、医療機関の選定や診断の品質保証に関する基準の整備が不可欠である。これらの取り組み・検討を通じて、移民労働者が帰国後も適切な健康管理を受けることができる余地が見出されるものと期待される。

E. 結論

本年度の調査によって、各国の研究協力者との連携は取れたものの、それぞれの国での事情が異なり、行政担当者と研究者との両方の協力を取ることのできる体制構築はかなりの努力が必要であることが判明した。また、ベトナム、ネパールにおけるOSHサービスの提供システム及び品質保証システムについての文献調査を終えることができた。調査対象国の健康診断実施病院候補リストの収集と病院調査の実施は次年度以降の課題となった。

F. 健康危険情報

該当なし

G. 研究発表

1. 論文発表

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97th Annual Meeting of Japan Society for Occupational Health, 第 97 回日本産業衛生学会, Hiroshima, May 2024

H. 知的財産権の出願・登録状況(予定を含む)

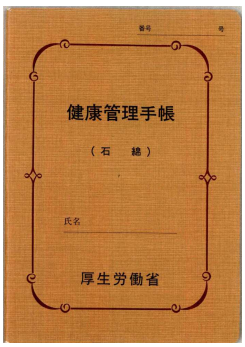
1. 特許取得
該当なし
2. 実用新案登録
該当なし

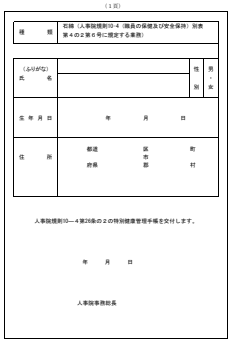
Overseas Health Checkup Initiative (OHCI): Notebook of Personal Health Records (nPHR)

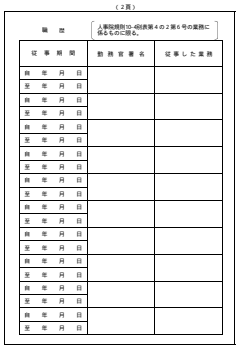
Narufumi Suganuma, MD, PhD, Kahoko Yasumitsu-Lovell, PhD
Takeshi Murakami, MSc, MBA
Professor, Department of Environmental Medicine,
Kochi Medical School

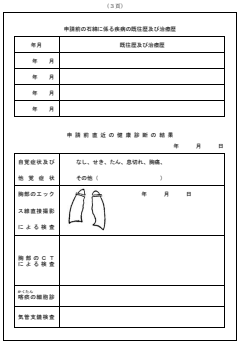
健康管理手帳の構成

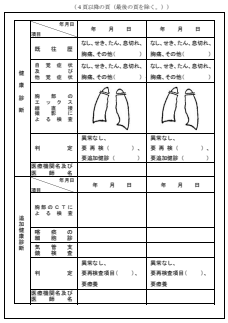
表紙 **P1 個人情報** **P2 職歴** **P3 既往歴、申請前の健診結果等** **P4以降、健診結果**







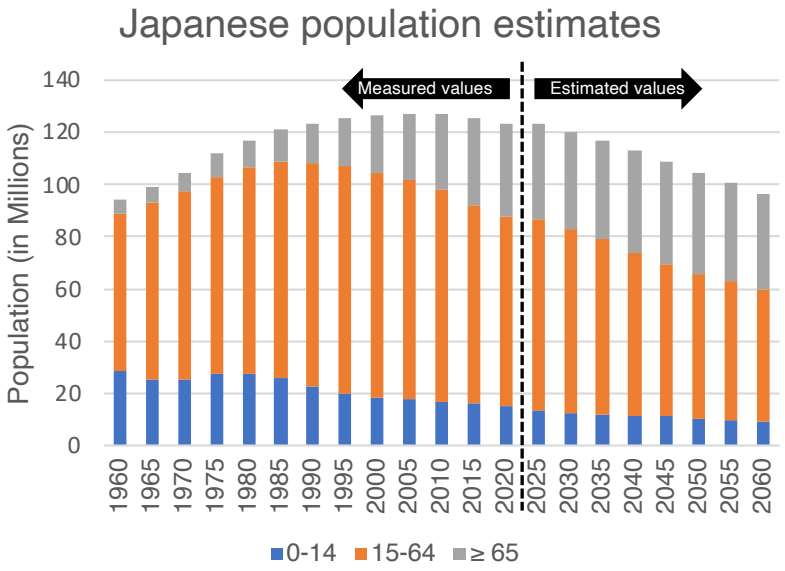




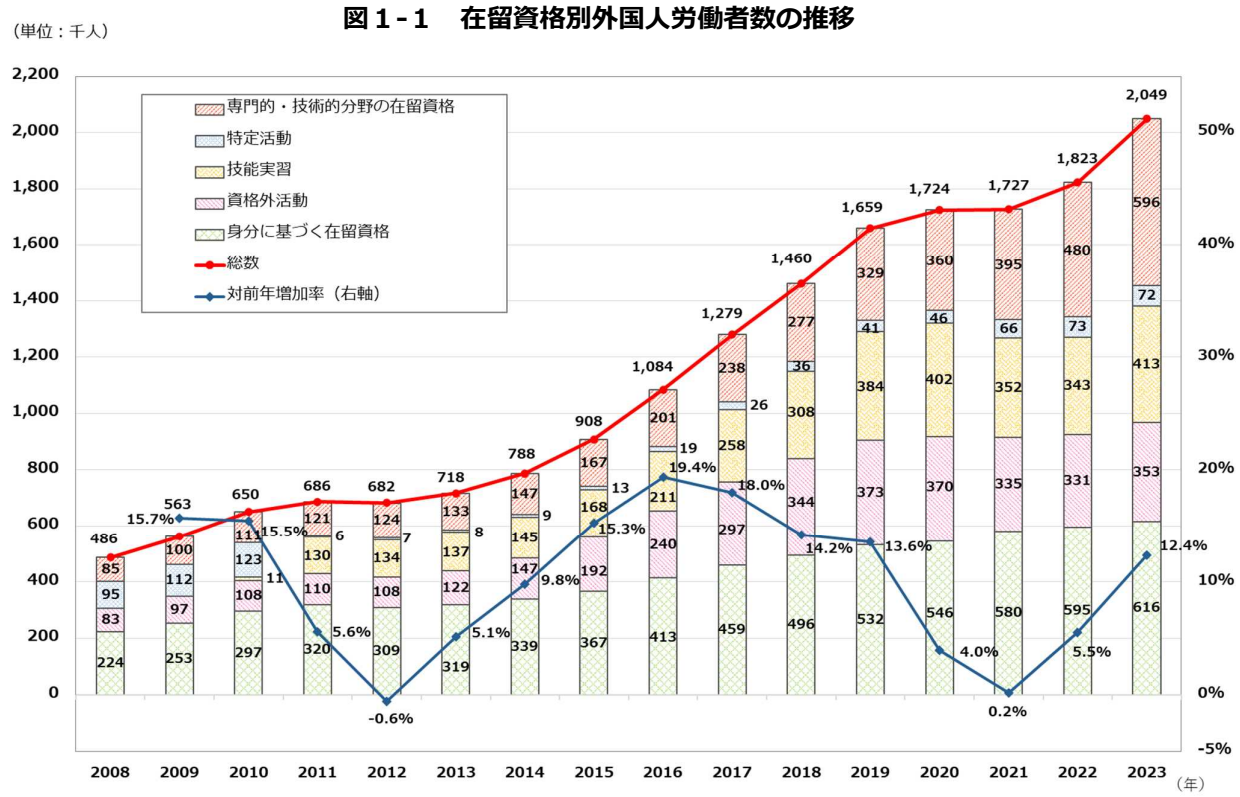
労働安全衛生規則 第六章 第二節 第五十四条（様式第八号）：
https://www.japaneselawtranslation.go.jp/en/laws/view/3878#je_pt1ch9sc4at2
https://www.jinji.go.jp/kisoku/tsuuchi/10_nouritu/1003005_S62shokufuku691bessi4-2.pdf

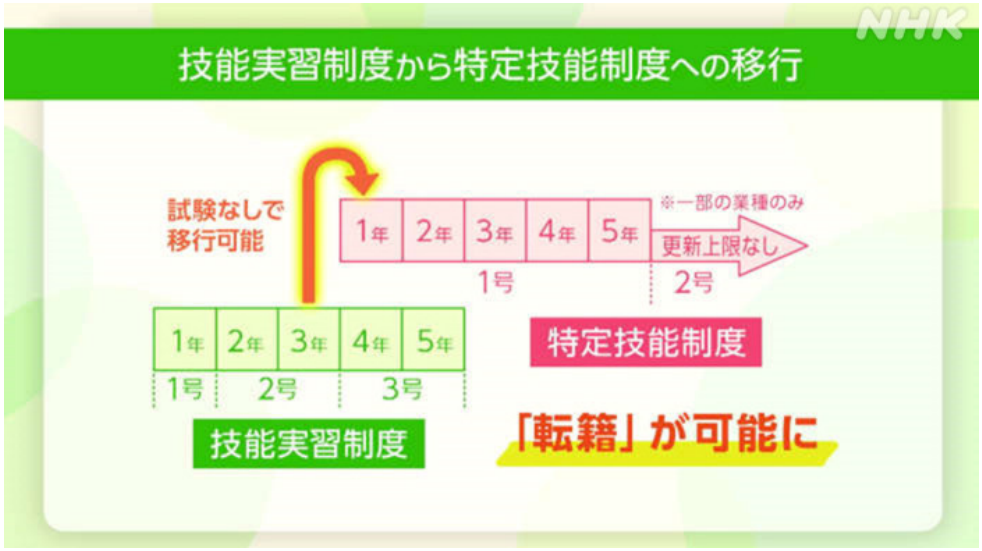
Basic information of Japan

- Area: 377,973 km^2 (47 prefectures)
- Population in 2023: 124.3 millions
- Total Labor Force in 2023: 67.7 millions
- Enterprises in 2021: 3.7 millions
- GDP in 2023: USD 5,820 billions



Japanese labor force is on the declining trend.

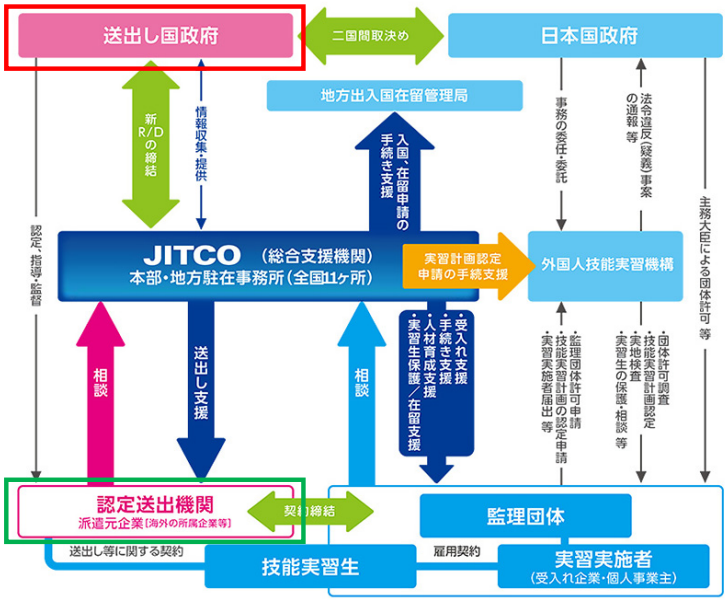




	分野	所管省庁
1	介護	厚生労働省
2	ビルクリーニング	
3	素形材・産業機械・電気電子情報関連製造業	経済産業省
4	建設	国土交通省
5	造船・舶用工業	
6	自動車整備	
7	航空	
8	宿泊	
9	農業	農林水産省
10	漁業	
11	飲食料品製造業	
12	外食業	

https://www.nhk.or.jp/heart-net/article/845/

技能実習制度におけるJITCOと関係機関 （団体監理型での技能実習生受入れのケース）



https://www.jitco.or.jp/ja/jitco/index.html

❸ 送出政府機関名・二国間協力覚書締結日・認定送出機関数

国名	政府機関名	二国間協力覚書締結日	二国間協力覚書に基づく認定送出機関数（JITCO更新日 2024年1月31日）
インド	全国技能開発公社（NSDC）	18.2.22	30
インドネシア	労働省(MOM) 訓練・生産性開発総局	10.3.8	435
ウズベキスタン	雇用・労働関係省（MEHNAT） ※締結当時：労働・人口社会保障省(MLSP)	12.5.28	8
カンボジア	労働・職業訓練省(MLVT)	19.11.29	100
スリランカ	海外雇用省(MFE) 海外雇用庁（SLBFE）	18.5.31	111
タイ	労働省 雇用局(DOE)	20.2.3	61
中国	国家外国専家局(専家局)	10.4.26	(8) (旧制度のJITCO R/Dに基づく認定送出機関数)
	名称変更：中日人材協力機構（2023.05.10）	10.3.31	(235) (旧制度のJITCO R/Dに基づく認定送出機関数)
ネパール	労働雇用・社会保障省（MoLESS）	24.1.1	(206) (旧制度のJITCO R/Dに基づく認定送出機関数)
パキスタン	教育・職業訓練省（MOFEPT）	19.8.28	20
バングラデシュ	海外居住者福利厚生・海外雇用省（MoEWOE）	18.3.27	80
フィリピン	労働・雇用省 海外雇用庁(POEA)／ 海外労働福祉庁(OWWA)	11.6.2	224
ベトナム	労働・傷病兵・社会省 海外労働局(DOLAB)	19.11.25	436
ペルー	労働・雇用促進省 （MTPE）	10.4.21	確認中（注）
ミャンマー	労働・入国管理・人口省 労働局(DOL)	13.5.20	425
モンゴル	労働・社会保障省(MLSP) 雇用政策推進調整局	10.7.1	70
ラオス	労働社会福祉省(MLSW)	18.5.11	26

（注）ペルーについては、2010年4月の協議で、MTPEより認定送出し機関の新規選定を行っているとの説明があり、送出し機関数は確認中である。

https://www.jitco.or.jp/ja/regulation/send/

［別表１］国籍別・在留資格別外国人労働者数

令和５年10月末時点　　（単位：人）

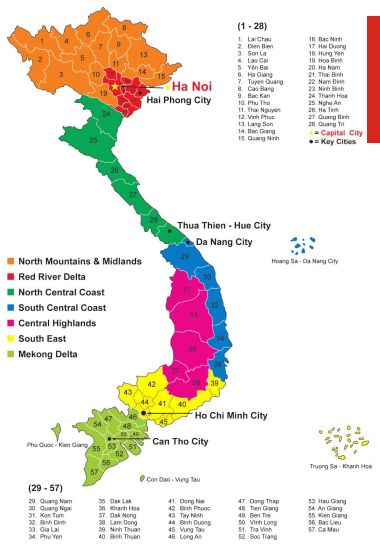
	全在留資格計（注１）	①専門的・技術的分野の在留資格（注２） 計	うち技術・人文知識・国際業務	うち特定技能	②特定活動（注３）	③技能実習	④資格外活動 計	うち留学	⑤身分に基づく在留資格 計	うち永住者	うち日本人の配偶者等	うち永住者の配偶者等	うち定住者	⑥不明
全国籍計	2,048,675	595,904 (29.1%)	366,168 (17.9%)	138,518 (6.8%)	71,676 (3.5%)	412,501 (20.1%)	352,581 (17.2%)	273,777 (13.4%)	615,934 (30.1%)	371,296 (18.1%)	100,977 (4.9%)	18,076 (0.9%)	125,585 (6.1%)	79 (0.0%)
ベトナム	518,364 [25.3%]	159,962 (30.9%)	84,65 (16.3%)	69,462 (13.4%)	27,301 (5.3%)	209,305 (40.4%)	101,530 (19.6%)	82,644 (15.9%)	20,262 (3.9%)	9,561 (1.8%)	5,340 (1.0%)	1,605 (0.3%)	3,756 (0.7%)	4 (0.0%)
中国（香港、マカオを含む）	397,918 [19.4%]	148,207 (37.2%)	113,01 (28.4%)	8,782 (2.2%)	4,518 (1.1%)	36,558 (9.2%)	73,621 (18.5%)	59,501 (15.0%)	135,004 (33.9%)	100,192 (25.2%)	17,310 (4.4%)	6,501 (1.6%)	11,001 (2.8%)	10 (0.0%)
フィリピン	226,846 [11.1%]	30,458 (13.4%)	9,64 (4.3%)	14,680 (6.5%)	5,085 (2.2%)	37,856 (16.7%)	3,463 (1.5%)	2,318 (1.0%)	149,975 (66.1%)	88,082 (38.8%)	20,807 (9.2%)	3,672 (1.6%)	37,414 (16.5%)	9 (0.0%)
ネパール	145,587 [7.1%]	39,196 (26.9%)	29,10 (20.0%)	3,561 (2.4%)	3,024 (2.1%	1,968 (1.4%)	95,325 (65.5%)	60,723 (41.7%)	6,072 (4.2%)	3,179 (2.2%)	1,390 (1.0%)	679 (0.5%)	824 (0.6%)	2 (0.0%)
ブラジル	137,132 [6.7%]	1,017 (0.7%)	62 (0.5%	20 (0.0%)	130 (0.1%	63 (0.0%)	479 (0.3%)	422 (0.3%)	135,442 (98.8%)	67,697 (49.4%)	15,767 (11.5%)	1,203 (0.9%)	50,775 (37.0%)	1 (0.0%)
インドネシア	121,507 [5.9%]	34,299 (28.2%)	6,21 (5.1%	25,589 (21.1%)	5,212 (4.3%	68,236 (56.2%)	6,633 (5.5%)	6,119 (5.0%)	7,127 (5.9%)	3,701 (3.0%)	1,722 (1.4%)	204 (0.2%)	1,500 (1.2%)	0 (0.0%)
韓国	71,454 [3.5%]	30,758 (43.0%)	26,77 (37.5%	173 (0.2%)	2,216 (3.1%	13 (0.0%)	7,198 (10.1%)	6,124 (8.6%)	31,264 (43.8%)	22,733 (31.8%)	6,288 (8.8%)	537 (0.8%)	1,706 (2.4%)	5 (0.0%)
ミャンマー	71,188 [3.5%]	18,927 (26.6%)	9,80 (13.8%	8,364 (11.7%)	11,656 (16.4%	24,130 (33.9%)	12,344 (17.3%)	11,546 (16.2%)	4,131 (5.8%)	1,384 (1.9%)	562 (0.8%)	139 (0.2%)	2,046 (2.9%)	0 (0.0%)
タイ	36,543 [1.8%]	8,495 (23.2%)	3,03 (8.3%	2,875 (7.9%)	626 (1.7%	12,087 (33.1%)	2,038 (5.6%)	1,888 (5.2%)	13,295 (36.4%)	8,004 (21.9%)	3,152 (8.6%)	368 (1.0%)	1,771 (4.8%)	2 (0.0%)
ペルー	31,584 [1.5%]	209 (0.7%)	10 (0.3%	11 (0.0%)	43 (0.1%	65 (0.2%)	99 (0.3%)	91 (0.3%)	31,167 (98.7%)	21,287 (67.4%)	1,403 (4.4%)	787 (2.5%)	7,690 (24.3%)	1 (0.0%)
G７等（注４）	83,882 [4.1%]	46,819 (55.8%)	26,25 (31.3%	61 (0.1%)	1,389 (1.7%	13 (0.0%)	3,332 (4.0%)	2,671 (3.2%)	32,289 (38.5%)	17,338 (20.7%)	13,833 (16.5%)	298 (0.4%)	820 (1.0%)	40 (0.0%)
うちアメリカ	34,861 [1.7%]	20,580 (59.0%)	9,93 (28.5%	9 (0.0%)	131 (0.4%	4 (0.0%)	902 (2.6%)	666 (1.9%)	13,207 (37.9%)	7,033 (20.2%)	5,725 (16.4%)	102 (0.3%)	347 (1.0%)	37 (0.1%)
うちイギリス	12,945 [0.6%]	7,353 (56.8%)	4,19 (32.4%	5 (0.0%)	204 (1.6%	0 (0.0%)	264 (2.0%)	194 (1.5%)	5,123 (39.6%)	2,953 (22.8%)	2,047 (15.8%)	40 (0.3%)	83 (0.6%)	1 (0.0%)
その他	206,670 [10.1%]	77,557 (37.5%)	56,93 (27.5%	4,940 (2.4%)	10,476 (5.1%	22,207 (10.7%)	46,519 (22.5%)	39,730 (19.2%)	49,906 (24.1%)	28,138 (13.6%)	13,403 (6.5%)	2,083 (1.0%)	6,282 (3.0%)	5 (0.0%)

注１：［ ］内は、外国人労働者総数（全国籍計）に対する当該国籍の外国人労働者数の割合を示す。（ ）内は、国籍別の外国人労働者総数（全在留資格計）に対する当該在留資格の外国人労働者数の割合を示す。なお、割合の数値は小数点以下第２位を四捨五入しているため、合計が100％にならない場合がある。

注２：「①専門的・技術的分野の在留資格」には、在留資格「教授」、「芸術」、「宗教」、「報道」、「高度専門職１号・２号」、「経営・管理」、「法律・会計業務」、「医療」、「研究」、「教育」、「技術・人文知識・国際業務」、「企業内転動」、「介護」、「興行」、「技能」、「特定技能１号・２号」が含まれる。

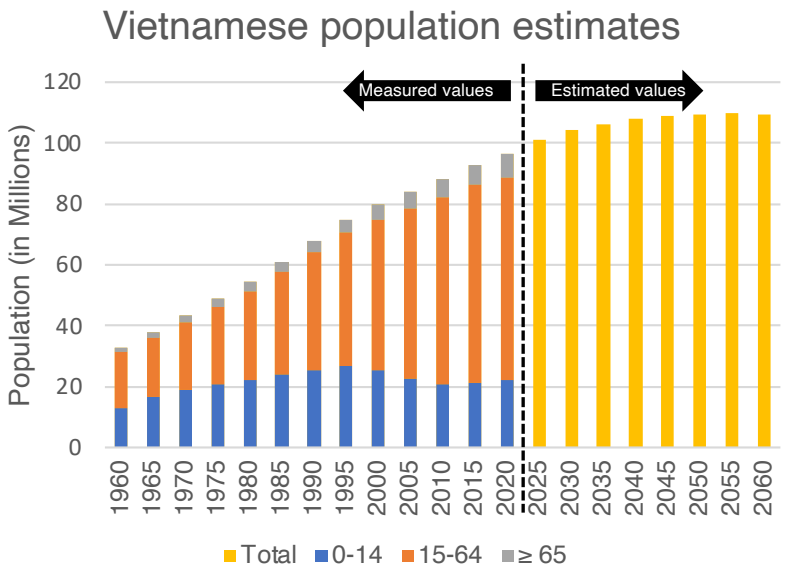
注３：在留資格「②特定活動」に該当する活動には、外交官等の家事使用人、ワーキング・ホリデー、経済連携協定に基づく外国人看護師・介護福祉士候補者等が含まれる。

注４：G７等とは、フランス、アメリカ、イギリス、ドイツ、イタリア、カナダ、オーストラリア、ニュージーランド、ロシアをいう。

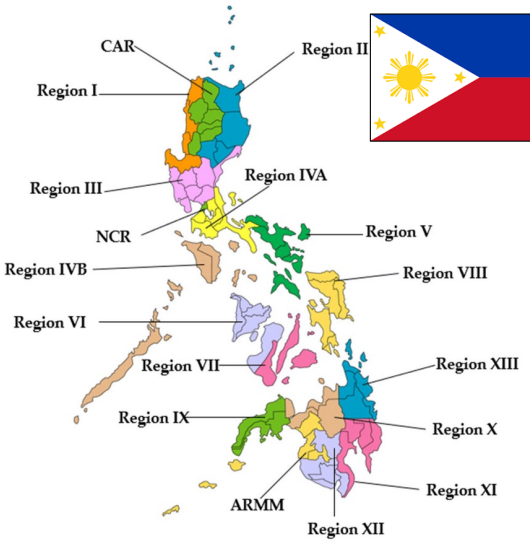


Basic information of Vietnam

- Area: 330,991 km^2 (63 provinces/Cities)
- Population in 2023: 100.3 millions
- Total Labor Force in 2023: 52.4 millions
- Enterprises in 2019: 0.7 millions
- GDP in 2023: USD 409 billions

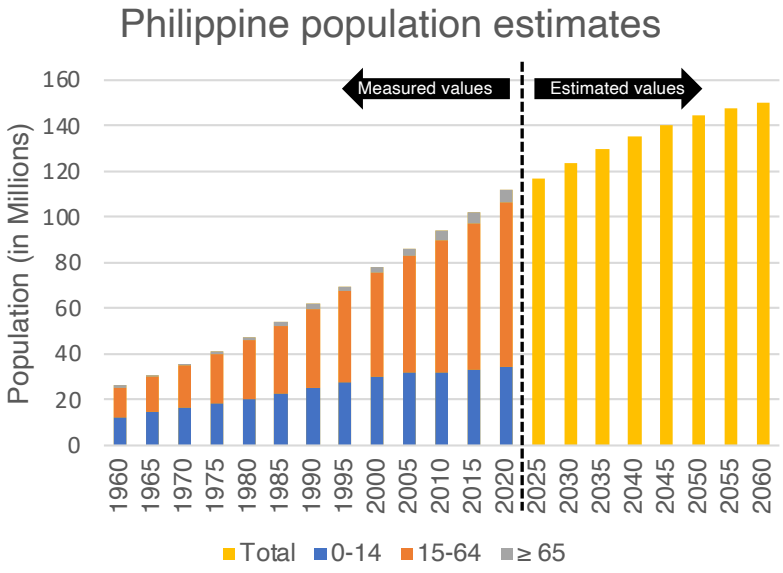


Vietnam's population is on the increase.



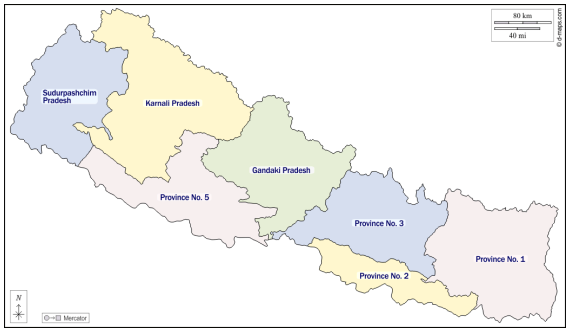
Basic information of Philippines

- Area: 300,000 km^2 (82 provinces)
- Population in 2023: 117.3 millions
- Total Labor Force in 2023: 50.5 millions
- Enterprises in 2019: 1.0 millions
- GDP in 2023: USD 404 billions

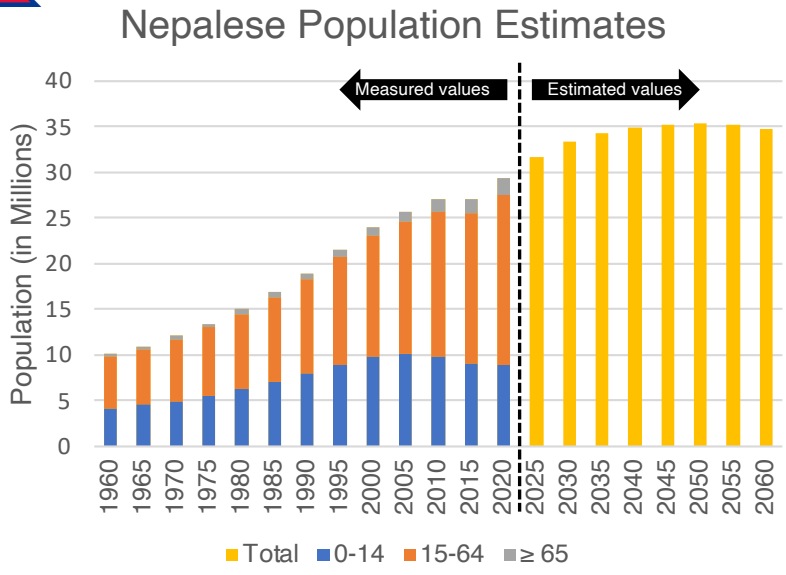


The population of the Philippines is increasing.

Basic information of Nepal

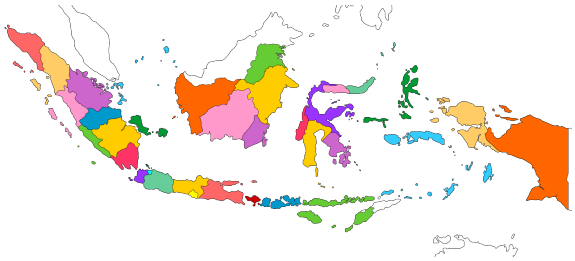


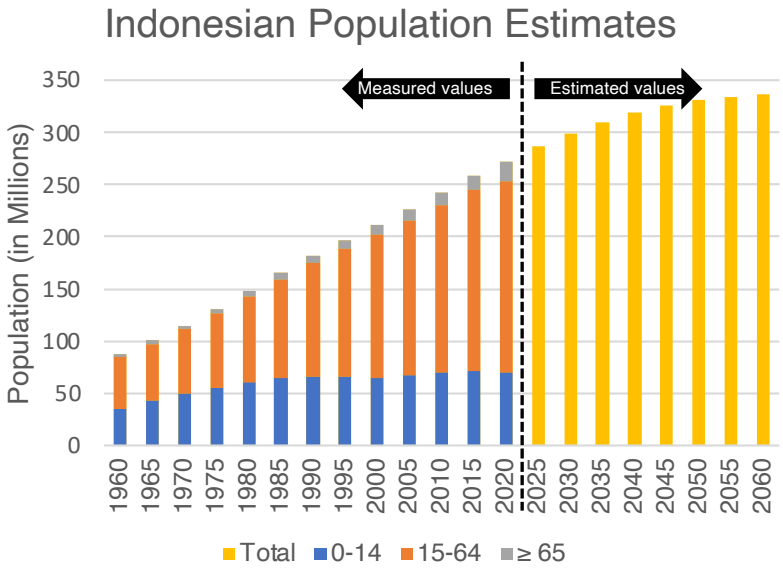
- Area: 147,200 km^2 (7 provinces)
- Population in 2023: 30.7 millions
- Total Labor Force in 2022: 8.7 millions
- Enterprises in 2019: 0.4 millions
- GDP in 2023: USD 41 billions



The population of the Nepal is increasing.

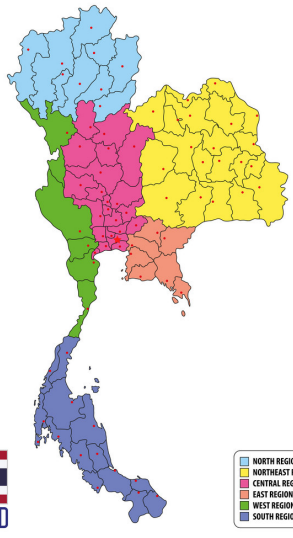
Basic information of Indonesia



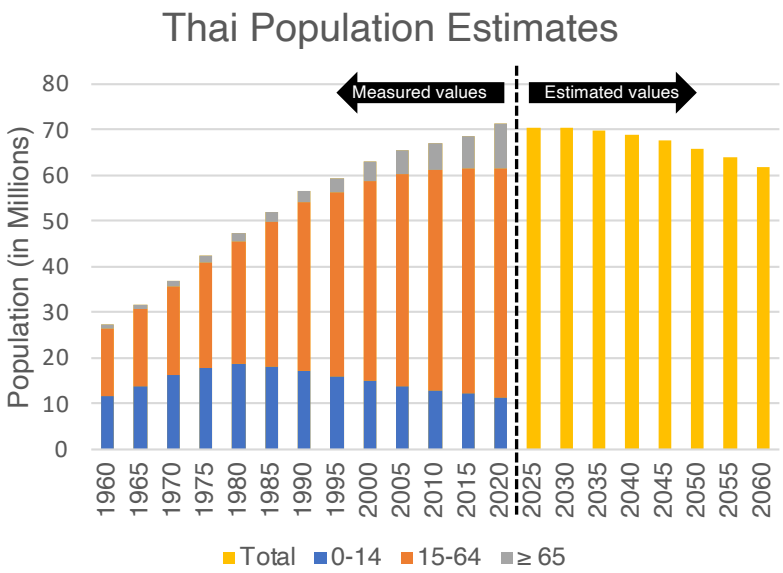


- Area: 1,904,569 km^2 (38 provinces)
- Population in 2023: 277.5 millions
- Total Labor Force in 2023: 146.6 millions
- Enterprises in 2019: 65.5 millions
- GDP in 2023: USD 1,319 billions

The population of the Indonesia is increasing.



Basic information of Thailand



- Area: 513,100 km^2 (76 provinces)
- Population in 2023: 71.8 millions
- Total Labor Force in 2023: 40.1 millions
- Enterprises in 2019: 3.1 millions
- GDP in 2023: USD 495 billions

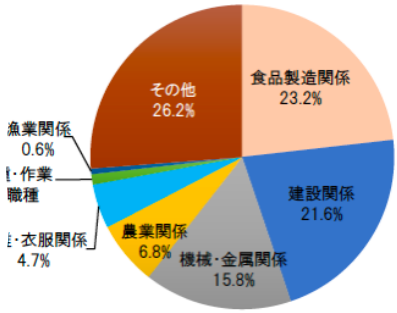
The population of the Thailand is increasing.

技能実習計画認定件数の多い上位３か国について、職種別の構成をみると、以下のような結果となっている。

Year 2021

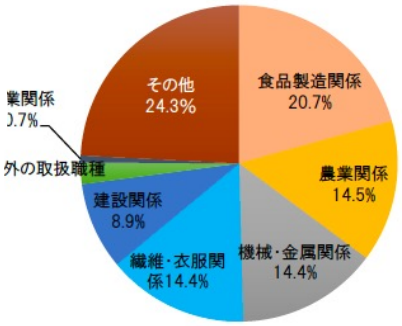
Vietnam, n = 90,753

図1-6　ベトナム



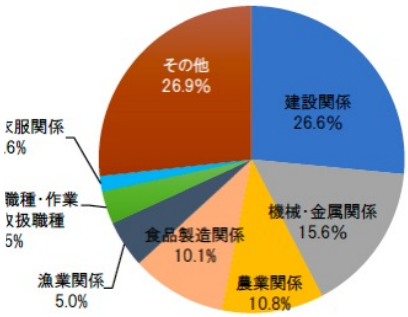
China, n = 22,879

図1-7　中国



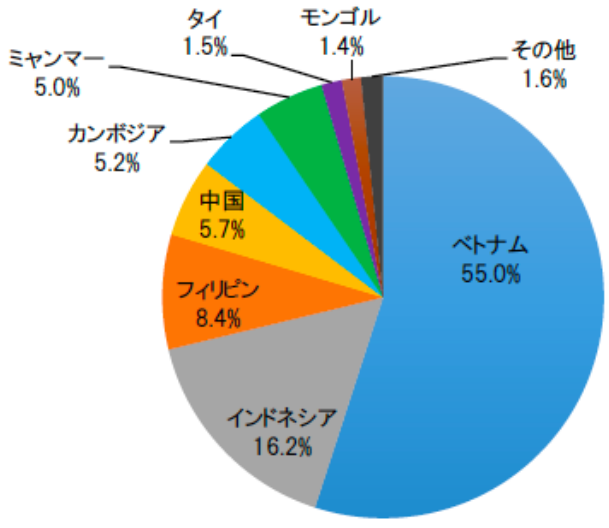
Indonesia, n = 21,651

図1-8　インドネシア



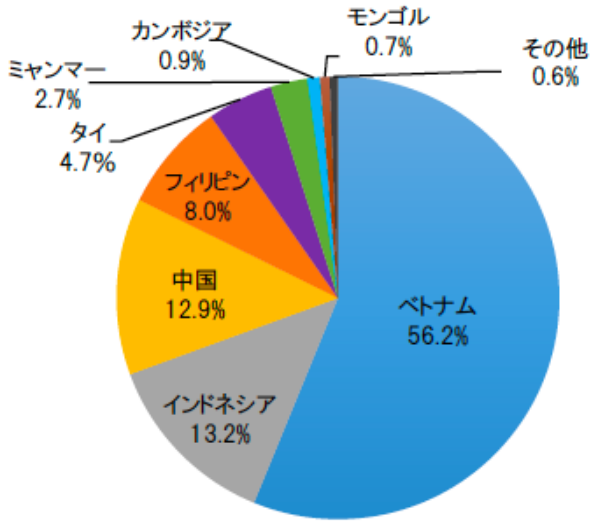
Construction related

図1-9　建設関係



Metal related

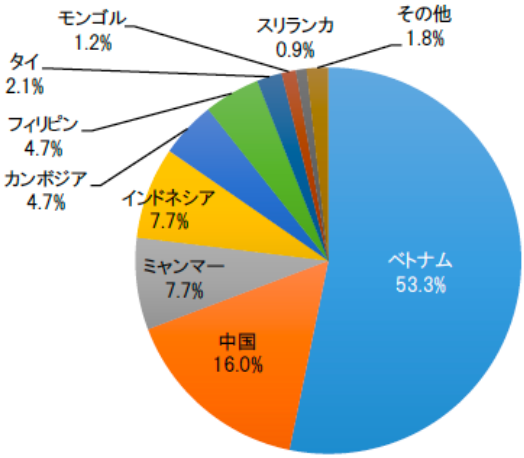
図1-11　機械・金属関係



送出国・地域別監理団体許可件数（2-5）【図2-2】

監理団体が許可を受ける際に申請する外国の送出機関を送出国・地域別にみると、ベトナムの180件（296件）が53.3％と最も多く、次いで中国が54件（67件）で16.0％、ミャンマー26件（47件）とインドネシア26件（28件）が7.7％となっている。

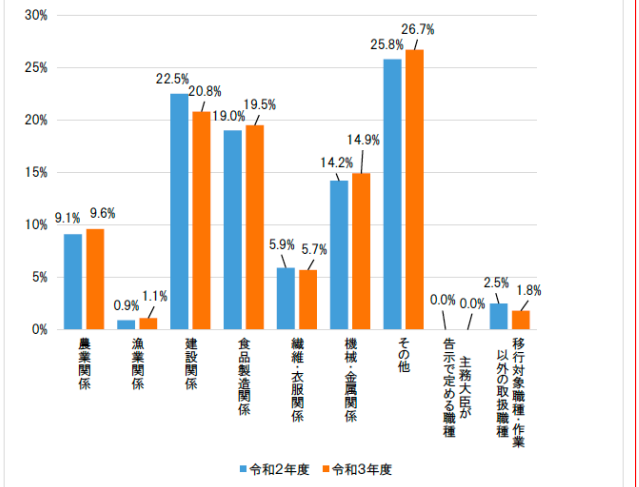
図2−2　送出国･地域別監理団体許可件数（構成比）



３職種別技能実習計画認定件数（1−4）【図1-4】

職種別にみると、職種全体のうち、建設関係の職種が最も多く20.8％（22.5％）、次いで食品製造関係の職種が19.5％（19.0％）、機械・金属関係の職種が14.9％（14.2％）となっている。
また、移行対象職種・作業以外の取扱職種による技能実習計画の認定を受けた件数の割合は、全体の1.8％（2.5％）となっている。

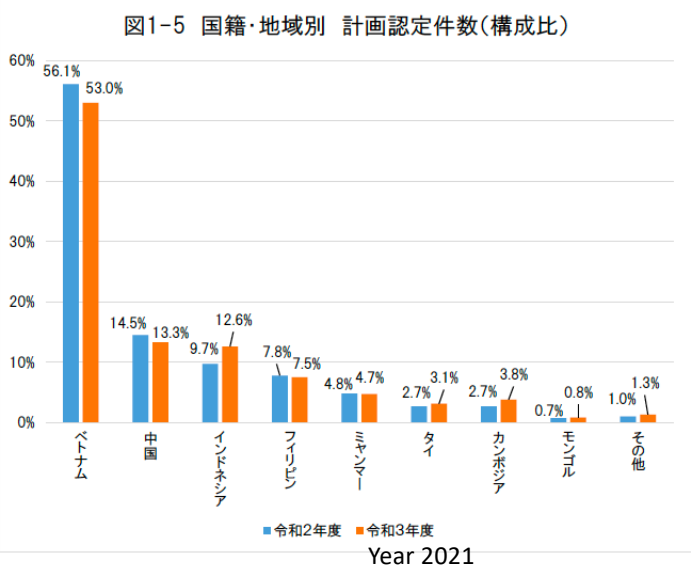
図1−4　職種別　計画認定件数（構成比）



※１　その他の職種は、家具製作、印刷、製本、プラスチック成形、強化プラスチック成形、塗装、溶接、工業包装、紙器･段ボール箱製造、陶磁器工業製品製造、自動車整備、ビルクリーニング、介護、リネンサプライ、コンクリート製品製造、宿泊、ＲＰＦ製造、鉄道施設保守整備、ゴム製品製造である。以下同じ。
※２　主務大臣が告示で定める職種は、空港グランドハンドリングである。以下同じ。
※３　移行対象職種･作業以外の取扱職種は、第２号技能実習又は第３号技能実習を実施できない職種である。以下同じ。

4　国籍・地域別技能実習計画認定件数（1-5）（1-6）【図 1-5】～【図 1-11】

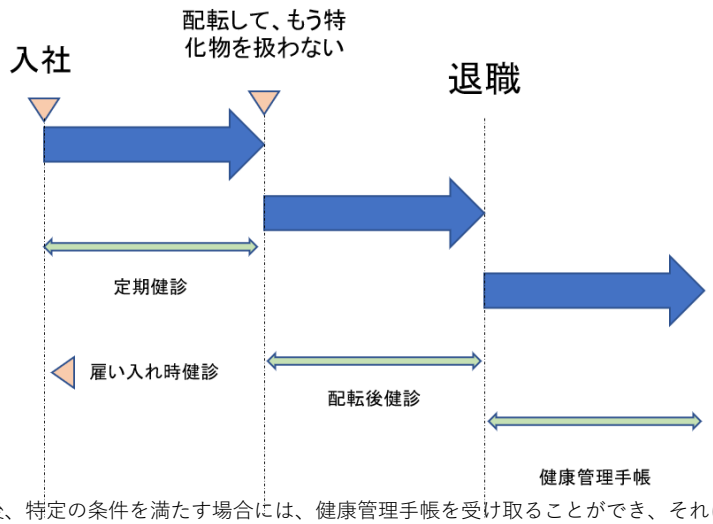
技能実習生の国籍・地域別に構成をみると、ベトナムが 90,753 件（143,742 件）で 53.0%（56.1%）と全体の半分を占め、次いで中国の 22,879 件（37,208 件）で 13.3%（14.5%）、インドネシアの 21,651 件（24,922 件）で 12.6%（9.7%）となっている。



Year 2021

健康管理手帳新規交付数 (2018-2022)

	2018	2019	2020	2021	2022
ベンジジン等業務	4	0	0	1	1
ベーターナフチルアミン等業務	0	0	0	0	0
石綿等業務	1,316	1,363	1,229	1,236	939
粉じん作業	292	248	207	302	157
クロム酸等業務	8	4	6	9	3
砒素業務	0	0	0	0	0
コールタール業務	59	62	58	93	69
ビス(クロロメチル)エーテル業務	0	0	0	0	0
ベリリウム業務	0	0	0	0	0
ベンゾトリクロリド業務	0	0	0	0	0
塩化ビニル業務	35	25	31	31	18
ジアニシジン等業務	1	2	1	2	2
1,2-ジクロロプロパン業務	1	4	1	5	1
オルト-トルイジン業務	-	20	30	5	4
合計	1,716	1,728	1,563	1,684	1,194



Health Management Handbook issued (as of end of 2022)

健康管理手帳交付状況（令和４年末現在）

業務		令和４年末現在交付数	
ベンジジン等業務		1,048	
ベータ－ナフチルアミン等業務		728	
石綿等業務		37,034	
粉じん作業	管理２	11,739	59,766
	管理３	10,993	
クロム酸等業務		695	(86.2%)
砒素業務		33	
コールタール業務		4,828	
ビス（クロロメチル）エーテル業務		85	
ベリリウム業務		2	
ベンゾトリクロリド業務		9	
塩化ビニル業務		1,869	
ジアニシジン等業務		186	
１，２－ジクロロプロパン業務		48	
オルト－トルイジン業務		55	
３，３’－ジクロロ－４，４’－ジアミノジフェニルメタン業務		0	
合計		69,352	

退職後、特定の条件を満たす場合には、健康管理手帳を受け取ることができ、それに基づき特定の医療機関で、年に2回(じん肺は年に1回)、無料の健康診断を受けることができる。健康管理手帳により健康診断を受診できる機関は、都道府県労働局長から指定される当該都道府県内の機関に限られているため、現行制度においては、仮にこのような外国人労働者が母国に帰国した場合には、母国においては健康管理手帳による健康診断は受診できないこととなる。

このようなことを背景として、技能実習に関する二国間取り決めを行っている国々のうち主要な国等を対象として、健康管理手帳制度に基づく健康診断を行う適切な医療機関等の把握、健康診断の実施方法・課題等について、海外の関係機関と連携して調査を行い、外国人労働者が母国に帰国した後の健康診断を通じた健康管理の方法について解決法や提案を行うことを目的とする。

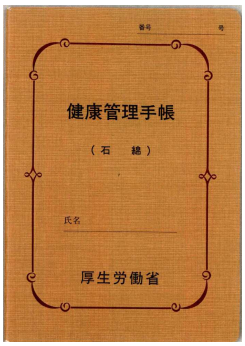
https://laoffice.jp/3667/

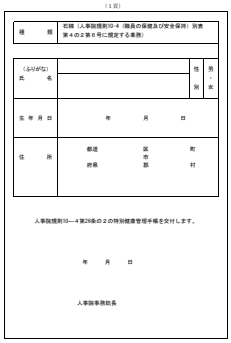
労働安全衛生法 第七章 第六十七条: https://www.japaneselawtranslation.go.jp/en/laws/view/3440#je_ch7at19

労働安全衛生法施行令 第二十三条: https://www.japaneselawtranslation.go.jp/en/laws/view/3817#je_at31

健康管理手帳の構成（石綿等業務の場合）

表紙　**P1 個人情報**　**P2 職歴**　**P3 既往歴、申請前の健診結果等**　**P4以降、健診結果**



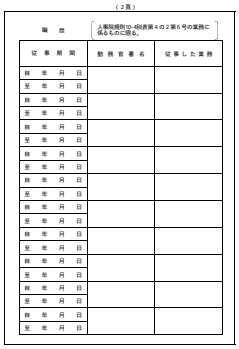

（1頁）

種　類	石綿（人事院規則10-4（職員の保健及び安全保持）別表第４の２第６号に規定する業務）
（ふりがな） 氏　名	男・女
生年月日	年　月　日
住　所	都道府県　区市部　町村

人事院規則10－4第26条の２の特別健康管理手帳を交付します。

年　月　日

人事院事務総長


（2頁）

職　歴　（人事院規則10-4別表第４の２第６号の業務に係るものに限る。）

従事期間	勤務官署名	従事した業務
自　年　月　日 至　年　月　日		
自　年　月　日 至　年　月　日		
自　年　月　日 至　年　月　日		
自　年　月　日 至　年　月　日		
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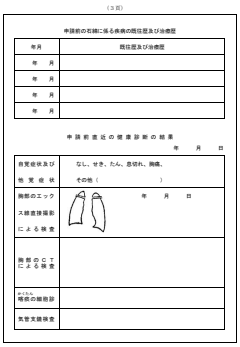

（3頁）

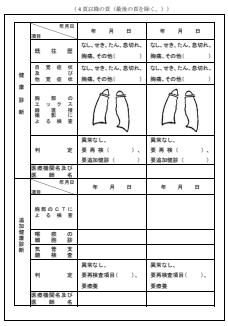
申請前の石綿に係る疾病の既往歴及び治療歴

年月	既往歴及び治療歴
年　月	
年　月	
年　月	
年　月	
年　月	

申請前直近の健康診断の結果

年　月　日

自覚症状及び他覚症状	なし、せき、たん、息切れ、胸痛、 その他（　　）
胸部のエックス線直接撮影による検査	年　月　日
胸部のCTによる検査	
肺機能検査	
その他の細胞診	
気管支鏡検査	


（4頁以降の頁（最後の頁を除く。））

健康診断	実施年月日	年　月　日	年　月　日
	既往歴	なし、せき、たん、息切れ、胸痛、その他（　）	なし、せき、たん、息切れ、胸痛、その他（　）
	自覚症状及び他覚症状	なし、せき、たん、息切れ、胸痛、その他（　）	なし、せき、たん、息切れ、胸痛、その他（　）
	胸部エックス線直接撮影による検査		
	判定	異常なし、第１再検（　）、第２再検（　）、要追加健診（　）	異常なし、第１再検（　）、第２再検（　）、要追加健診（　）
	医療機関名及び医師名		
追加健康管理検査	実施年月日	年　月　日	年　月　日
	胸部のCTによる検査		
	肺機能検査		
	気管支鏡検査		
	判定	異常なし、要再検査項目（　）、要療養	異常なし、要再検査項目（　）、要療養
	医療機関名及び医師名		

労働安全衛生規則 第六章 第二節 第五十四条（様式第八号）：
https://www.japaneselawtranslation.go.jp/en/laws/view/3878#je_pt1ch9sc4at2
https://www.jinji.go.jp/kisoku/tsuuchi/10_nouritu/1003005_S62shokufuku691bessi4-2.pdf

健康管理手帳の交付要件

○健康管理手帳の交付要件

【石綿業務の場合】

次のいずれかに該当すること。

（１） 両肺野に石綿による不整形陰影があり、又は石綿による胸膜肥厚があること。（直接業務又は周辺業務が該当）

（２） 下記の作業に１年以上従事していた方。（ただし、初めて石綿の粉じんにばく露した日から１０年以上経過していること。）（直接業務のみが該当）

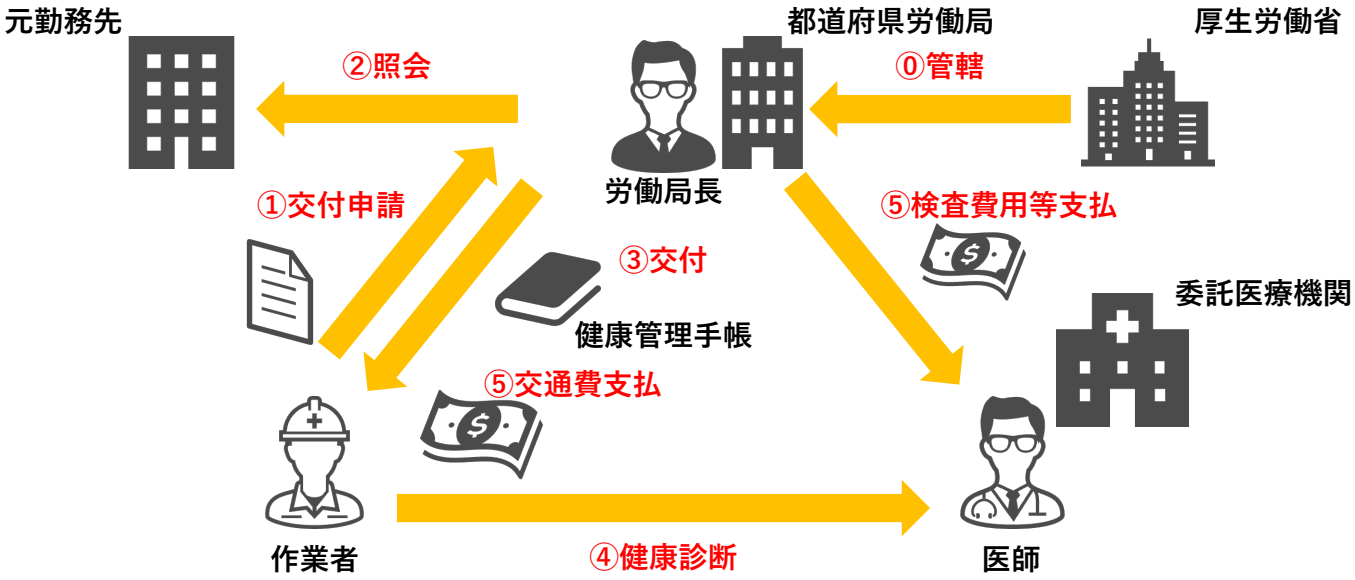
- 石綿の製造作業
- 石綿が使用されている保温材、耐火被覆材等の張付け、補修もしくは除去の作業
- 石綿の吹付けの作業又は石綿が吹き付けられた建築物、工作物等の解体、破砕等の作業

（３） （２）の作業以外の石綿を取り扱う作業に１０年以上従事していた方。（直接業務のみが該当）

【粉じん作業の場合】
じん肺法の規定により決定されたじん 肺管理区分が管理2又は管理3であること。

労働安全衛生規則 第六章 第二節 第五十三条: https://www.japaneselawtranslation.go.jp/en/laws/view/3878#je_pt1ch9sc4

健康管理手帳制度の仕組み



健康管理手帳を所持する作業者は、都道府県労働局と契約した委託医療機関にて、国の費用で健康診断を受けられる。

委託医療機関の要件

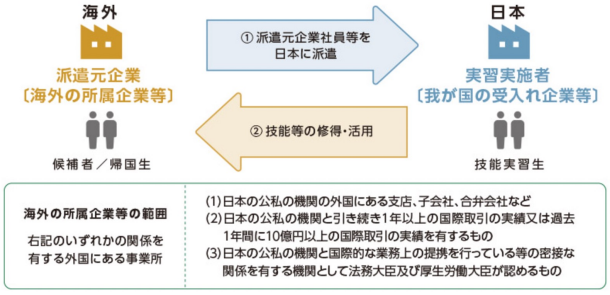
1. 当該健康診断に関し専門的知識及び経験を有する医師が充員されており、当該医師がその健康診断の実施に当たること。（中略）なお、石綿業務に係る健康管理手帳又は船員健康管理手帳の健康診断の実施に当たる医師は石綿関連疾患の診断に関する研修を修了していることが望ましい。
2. 臨床検査技師等当該健康診断に係る検査業務を円滑に遂行するために必要な者が充員されていること。
3. 委託する健康診断の種類に応じ、次に掲げる業務に係る健康診断の実施に必要な設備が装備されていること。
   - (コ) 石綿業務関係
     a. エックス線直接撮影装置及びエックス線特殊撮影装置
     b. 標本染色用器具
     c. 気管支ファイバースコープ又は気管支鏡
   - (イ) 粉じん業務関係
     a. エックス線直接撮影装置及びエックス線特殊撮影装置
     b. スパイロメーター及びフローボリューム曲線記録装置
     c. 動脈血ガス分析装置
     d. 顕微鏡及び細菌培養装置
     e. 標本染色用器具
4. (公社)全国労働衛生団体連合会の行う総合精度管理事業に参加している等、精度管理に努めていること。

厚生労働省労働基準局超通知：健康管理手帳所持者及び船員健康管理手帳所持者に対する健康診断実施要綱
https://www.mhlw.go.jp/web/t_doc?dataId=00tb5755&dataType=1&pageNo=1

1.4%

企業単独型

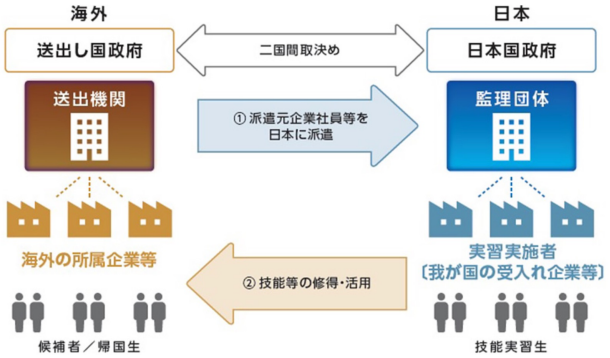
日本の企業等（実習実施者）が海外の現地法人、合弁企業や取引先企業の職員を受け入れて技能実習を実施する方式



98.6%

団体監理型

事業協同組合や商工会等の営利を目的としない団体（監理団体）が技能実習生を受け入れ、傘下の企業等（実習実施者）で技能実習を実施する方式

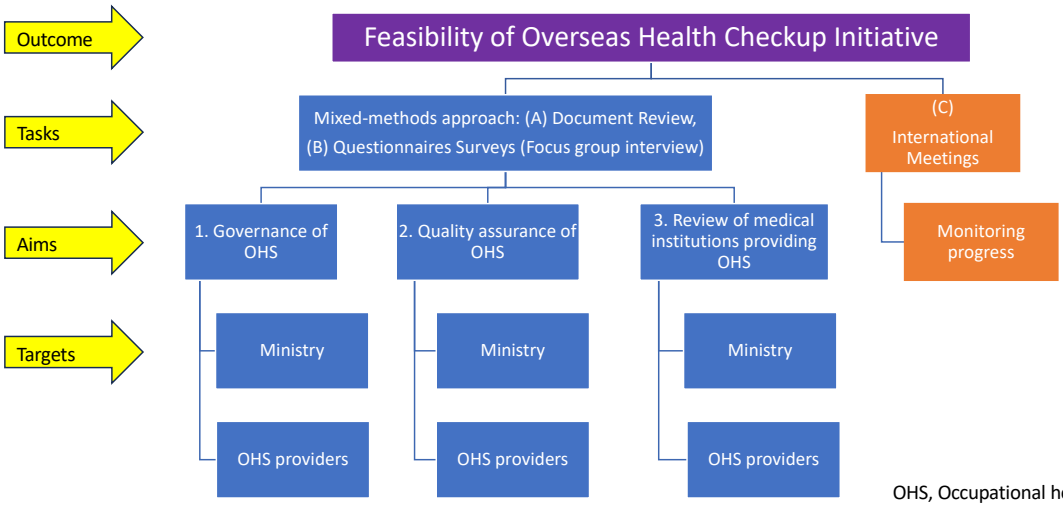


https://www.jitco.or.jp/ja/regulation/

OVERVIEW

Objectives:

- Identify gaps in providing health examinations to foreign workers after returning to their home countries.
- Investigate the availability of medical institutions capable of providing health examination services at a standard comparable to that of Japan.



OHS, Occupational health services

TASKS

(A) Document Review

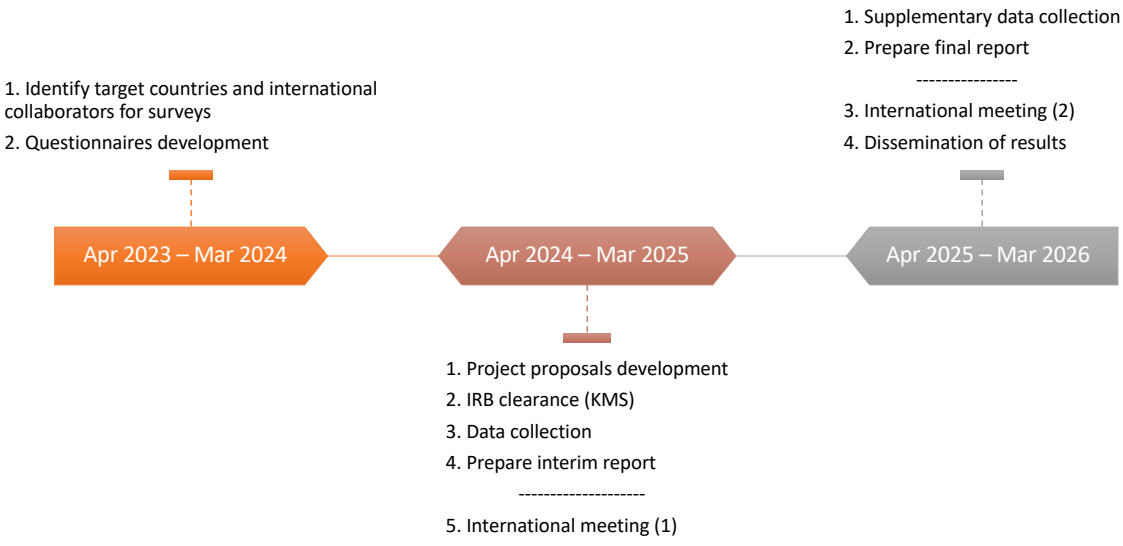
(B) Questionnaires Surveys

1. Identify international collaborator in each country
2. Develop questionnaires for each aim/target responder
3. Develop survey proposal covering all two aims and submit to the relevant authorities
4. Obtain ethical clearance from the Institutional Review Board (IRB) at Kochi Medical School, Kochi University; Informed consent from interviewees
5. Prepare reports (interim/final)

(C) International Meetings

1. Identify collaborator in each planned country for event arrangement
2. Identify potential venue in each planned country
3. Prepare meeting schedule
4. Preparations for international guests

TIME FRAME



INFO to collect: Governance of OHS

- Legislations/regulations (as well as for hazardous works)
  - responsible regulatory body
  - specific requirements: appointment of OH physicians/nurses by industries; standardized health examination for pneumoconiosis
  - monitoring system for compliance with regulations
  - **availability and frequency of health examinations for current/retired workers**
- Public/private hospitals dedicated to OHS
  - Occupational medicine section; OH physicians/nurses
- Types of OHS
  - In-house; External unit (Health checkup agencies)
- Who pays OHS fees?

INFO to collect: Quality assurance of OHS

- Governmental laws/regulations
  - responsible regulatory body
  - permission to establish OHS clinic/facility; certification to become OH physicians/nurses; certification to read pneumoconiosis CXR
- Formal quality assurance system
  - hospital accreditation system: registration and proof of quality of service
  - external quality assurance programs
  - certification program for OH physicians/nurses

- Availability of investigations/equipments
- Obtaining anonymized chest images (DICOM format) for survey

Responsibilities of Participating Countries

1. Conduct a comprehensive document review and submit findings to the principal investigator by August 2024. The document review will be divided into three sections to provide a detailed overview of occupational health services (OHS) in each collaborating country:
   - Governance of OHS
   - Quality assurance of OHS
   - Review of medical institutions providing OHS, with a focus on health examination services.
2. Conduct a questionnaire survey with key healthcare personnel to explore critical aspects of occupational health service delivery (Other options include organizing and facilitating focus group interviews).
3. Actively participate in international meetings convened with relevant ministerial and occupational healthcare personnel.

Merits for Participation in this Project

1. Facilitating collaboration between medical institutions in foreign countries and Japan, which will have benefits to the workers.
2. Participating countries will receive a financial incentive for each component of the document review.
3. Individuals in charge from each participating country will be acknowledged and included as co-authors in the final report.

ありがとう
ございました

参考資料

Study scheme

	List from Ministry of Health	Focus group	Site visit	Contact person	address
Hospital A	X	X	X	Dr's name	
Hospital B	X	NA	NA	Dr's name	
Hospital C	X	X	X	Dr's name	
Clinic AA	X	NA	NA	Dr's name	
Clinic BB	X	X	X	Dr's name	
Clinic CC	X	NA	NA	Dr's name	

Data collection

	Chest x-ray	PFT	CT	Bacteriology	Tissue staining
Hospital A	X	X	X	X	X
Hospital B	X	X	NA	X	X
Hospital C	X	X	NA	X	X
Clinic AA	X	NA	NA	NA	NA
Clinic BB	NA	X	X	NA	NA
Clinic CC	X	NA	NA	NA	NA

Q&A

1. How long is the Technical Intern Training program? Do the trainees stay and work in Japan after completion of the training?
   - TIT trainees can stay in Japan for 1~5 years. They can stay longer if they move to SSW.
2. What are today occupations with potential exposure to asbestos in Japan?
   - Demolition is one of the major asbestos-related works.
3. Are Japanese workers included among the numbers in the table of issued nPHR?
   - Yes.
4. Is the nPHR issued to all trainees who exposed to hazardous substances?
   - There is a requirement to issue an nPHR for each hazardous substance related work. The requirement for most hazardous substances was work history (≥ 3 months - ≥ 5 years). The requirement for dust-exposed works and Beryllium are pneumoconiosis cases. The requirement for asbestos-related works are CXR abnormalities or work history .
5. Workers may move address or change jobs after they returned home. How would you consider in situation where the workers are engaged in jobs with potential for exposure to hazardous substances after they returned home?
   - The requirements for the issuance of nPHRs, except for pneumoconiosis and asbestos-related work, are for work periods of one to five years or longer. In these cases, TIT trainees can be issued when they go back to their country. The cases of pneumoconiosis and asbestos-related work, nPHRs may be issued depend on the workers condition such as latent duration and exposure history.
6. Who pay for the cost of post-retirement health checkup, government or employer?
   - The Japanese government will pay for the medical examination. Transportation expenses are also paid to the workers.

Asbestos import and mesothelioma in Japan

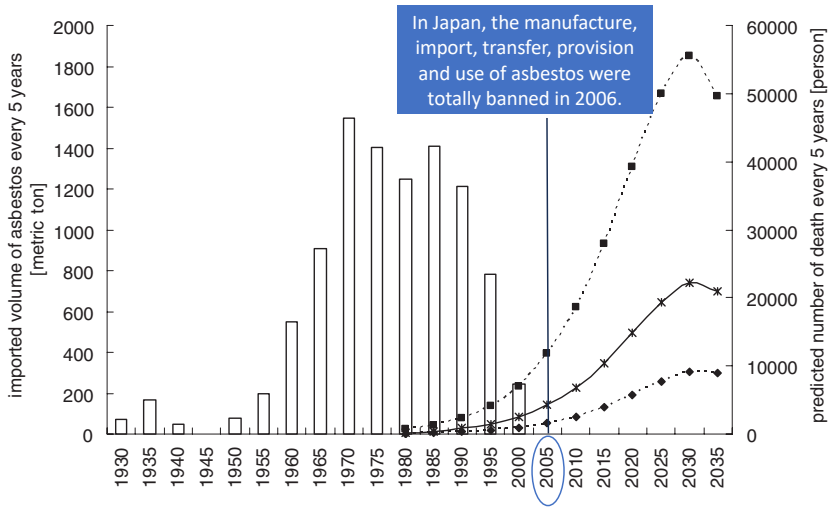
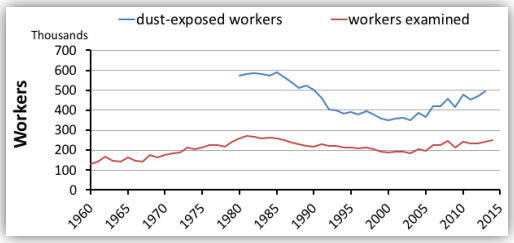


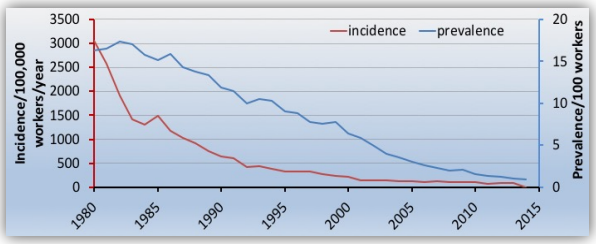
FIGURE 3. Estimated future deaths from pleural mesothelioma in Japan. Bar graph shows the imported amounts of asbestos for the 5-year period starting with the year indicated (e.g., 1980 represents the 5-year period of 1980 – 1984). These are almost equal to the amount of asbestos consumption in the period since asbestos mining capacity in Japan is negligible. The solid line shows the predicted curve with each data point representing the estimated number for the 5-year period starting with the year indicated. Broken lines show the 95% CI of the predicted curve.

Am. J. Ind. Med. 49:1–7, 2006.

Trend of pneumoconiosis in Japan

- Major industries creating risk
  - manufacturing, construction, mining
- Workers in dust-exposed works
  - 585,507 in 1982 → 492,788 in 2013
- Workers screened for pneumoconiosis
  - 265,720 in 1982 → 269,763 in 2016



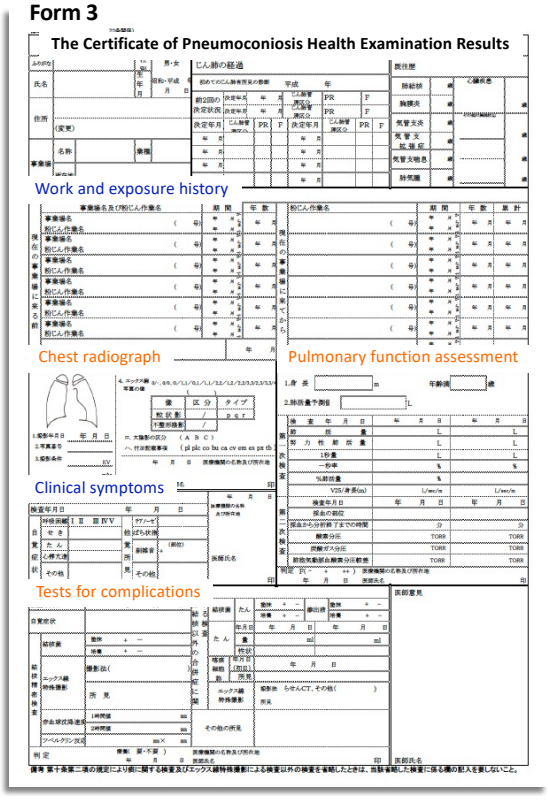


- Prevalence
  - 17.4% (46,235 cases) in 1982 → 0.7% (1,807 cases) in 2016
- New cases
  - 4,266 in 1982 → 210 in 2016
- Pneumoconiosis with complications
  - 120 in 2022

(Source: Results of periodic pneumoconiosis examination released by Ministry of Health, Labour and Welfare)

Which tests are performed in pneumoconiosis health examination?

- Certification program & training for occupational physicians
  - Japan Medical Association
  - University of Occupational and Environmental Health
- Questionnaires, physical examination
  - work and exposure history
  - clinical symptoms
- Chest radiograph
- Pulmonary function assessment
  - arterial blood gas (optional)
- Tests for complications (optional)
  - cytology, biopsy
  - CT for lung cancer



Requirements for Issuance of nPHR

	Operations	Requirements
1	Benzidine	≥ 3 months of work history
2	Beta-naphthylamine	
12	Dianisidine	
13	1,2-Dichloropropane	≥ 2 years of work history
15	3,3′-Dichloro-4,4′-diaminodiphenylmethane	
7	Bis (chloromethyl) ether	≥ 3 years of work history
9	Benzotrichloride	
4	Chromic acid	≥ 4 years of work history
10	Vinyl Chloride	
5	Arsene	≥ 5 years of work history
6	Coal tar	
14	Ortho-toluidine	
3	Dust-exposed works	Pneumoconiosis case
11	Asbestos-related works*	-
8	Beryllium	Pulmonary berylliosis case

* Asbestos-related works

Any of the following applies:

1. To have irregular shadows due to asbestos exposure on both lungs or pleural thickening due to asbestos exposure. (Direct or Indirect exposure) (NOTE: including pleural plaque)
2. Those who have been engaged in the following work for one year or more. (However, at least 10 years have passed since the date of the first exposure to asbestos dust.) (Only direct exposure)
   - Production of asbestos
   - Work to attach, repair, or remove heat insulation materials, fire-resistant cladding materials, etc. in which asbestos is used
   - Operation of spraying asbestos or demolition, crushing, etc. of buildings, structures, etc. sprayed with asbestos
3. A person who has been engaged in asbestos handling work other than the work described in (2) for 10 years or more. (Only direct exposure)

Ordinance on Industrial Safety and Health (**Order of the Ministry of Labour No. 32 of 1972**), Chapter VI, Section 2, Article 53:
https://www.japaneselawtranslation.go.jp/en/laws/view/3878#je_pt1ch9sc4

Items of health checkup

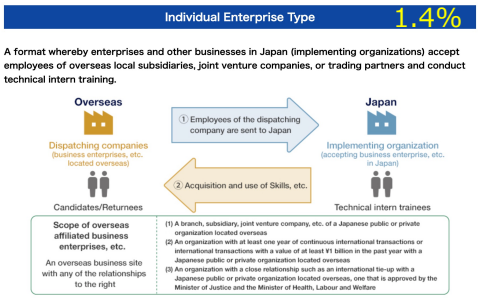
Operations	Frequency	Items
Dust-exposed works (Class 2)	once a year	1. work history , CXR 2. (For those who have been diagnosed as having pneumoconiosis) spiral CT and sputum cytology (if necessary)
Dust-exposed works (Class 3)	once a year	1. work history , CXR 2. Clinical examination of the chest, pulmonary function tests (except for the following persons); ● Those whose radiographs show large shadows exceeding one-third of one side of lung field (limited to those caused by pneumoconiosis); ● Those who have been diagnosed as having pulmonary tuberculosis as a result of detailed examination for tuberculosis. ● Those who have been diagnosed as suffering from complications other than pulmonary tuberculosis as a result of X-ray examination, clinical examination of the chest, and examination for complications other than pulmonary tuberculosis. 3. (For those who have been diagnosed as having pneumoconiosis, those who have or are suspected of having pulmonary tuberculosis) detailed examination for tuberculosis. (For those who have been diagnosed as having pneumoconiosis) spiral CT and sputum cytology (if necessary) (Of those who have been diagnosed as having pneumoconiosis, those who are suspected of suffering from complications other than pulmonary tuberculosis and primary lung cancer) examinations for complications other than pulmonary tuberculosis and primary lung cancer. (excluding those whose radiographs show large shadows exceeding one-third of one side of lung field)
Asbestos-related works	once every 6 months	1. Investigation of work history 2. Examination for the presence or absence of a history of symptoms/signs due to asbestos, such as cough, phlegm, shortness of breath, chest pain, etc. 3. Examination for the presence or absence of symptoms/signs such as cough, phlegm, shortness of breath, chest pain, etc. 4. Examination using X-ray photographs of the entire chest 5. When the results of the examination described in the preceding item fall under any of the following conditions and the physician deems it necessary, examination by a chest X-ray using a special imaging method (Computed Tomography) shall perform. 1) When it is difficult to interpret abnormal shadows (Excluding those caused by fibroproliferative changes due to asbestosis.) due to asbestos-induced diffuse pleural thickening, calcified pleural plaque, etc. (Excluding cases of irregular shadows due to asbestos in both lung fields.) 2) If there are abnormal shadows 6. If the examination results of the preceding two items (4. and 5.) show abnormal shadows and the physician deems necessary, performs sputum cytology and/or bronchoscopy (biopsy and pathological examination, if deemed necessary by the physician)

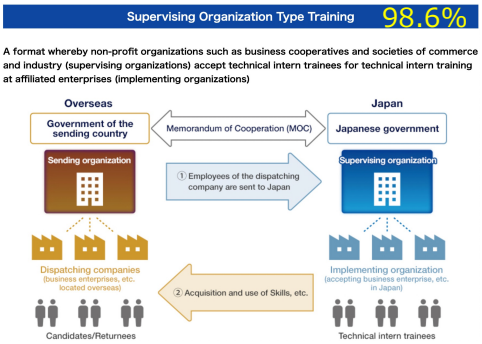
Circular notice of the Labour Standards Bureau of the Ministry of Health, Labour and Welfare No. 653 of 1972
https://www.jaish.gr.jp/anzen/hor/hombun/hor1-27/hor1-27-11-1-0.htm

History of TIT

late 1960s Foreign training by private companies
1982 Creation of the status of residence for "Foreign trainees" (Prototype of TIT)
Be granted "Individual Enterprise Type"
1990 Creation of the status of residence for "Training"
Be granted "Supervising Organization Type Training"
1991 Establishment of the "Japan International Training Cooperation Organization (JITCO)*"
1993 Establishment of the Technical Intern Training Program
2010 Creation of the status of residence for "Technical Intern Trainees (TIT)"
2017 Establishment of the "Organization for Technical Intern Training (OTIT)"
2019 Creation of the status of residence for "Specified Skilled Worker (SSW)"

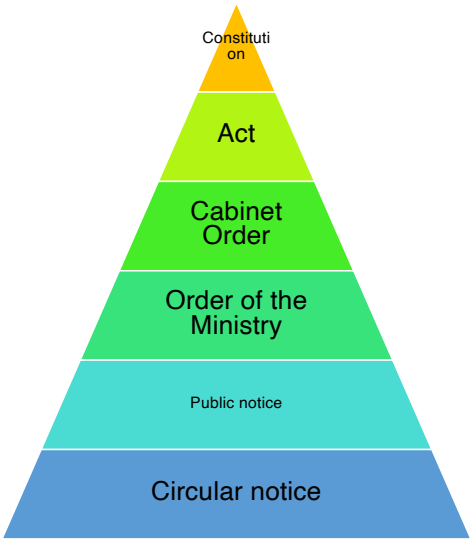
*Currently, Japan International Trainee & Skilled Worker Cooperation Organization (JITCO)





https://www.jitco.or.jp/en/regulation/

Japanese Regulation of health checkup based on nPHR



Regulation level	Regulation name	nPHR related	Contents
Act	Industrial Safety and Health Act (**Act No. 57 of 1972**)	Chapter 7, Article 67	Basic information of nPHR
Cabinet Order	Order for Enforcement of Industrial Safety and Health Act (**Cabinet Order No. 318 of 1972**)	Article 23	Issuance of nPHR (Works Issuing the nPHR)
Order of the Ministry	Ordinance on Industrial Safety and Health (**Order of the Ministry of Labour No. 32 of 1972**)	Chapter VI, Section 2, Article 53	Requirement for Issuance of nPHR
Circular notice	Circular notice of the Labour Standards Bureau of the Ministry of Health, Labour and Welfare	• No. 653 of 1972 • No. 762 of 1972 ➢ (The latest versions of both; No. 0526, Article 12 of 2020)	• Items of health checkup • Requirements for contract medical institutions

令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

アジア諸国の実情把握

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研究協力者:吉川　徹　独立行政法人労働者健康安全機構労働安全衛生総合研究所研究推進・国際協力センター　統括研究員

研究要旨

【目的】

本研究では、健康管理手帳制度による健康診断を諸外国で実施するための課題及び解決策を検討することを実現するために、実施対象となり得るアジアを中心とした諸外国の実情について調査を行ったうえで、対象国の選定と、その調査方法についてまとめることを目的とした。

【方法】

（1）我が国における外国人労働者の国籍や就労産業について、厚生労働省の統計などの集計をもとに文献調査を行なった。また、外国人労働者の健康管理に関する現状や技能実習生の動向についてもあわせて簡易な調査を実施した。

（2）また、我が国における健康管理手帳による健診制度の整理を行い、調査対象国での調査に必要な項目をまとめ、調査票を作成した。あわせて調査対象国の実情を確認すするため、各国のカウンターパートとなる海外協力者の選定を行ない、調査実施のための協議用資料を作成した。

【結果】

調査業種として健康管理手帳の交付件数の 9 割弱が石綿取り扱い作業と粉じん作業であることから、これらを中心として労働者の健康管理状況を把握することとした。

そのため、これらの作業に関連する業種としては、主には建設関係が考えられるが、外国人労働者、技能実習生の統計より得られた労働者数からは対象として、ベトナム、中国、インドネシア、フィリピン、ミャンマー、カンボジア、タイなどが考えられた。

これらの情報をもとに海外協力者に提示する提案書と質問票について作成を行った。

【考察】

外国人労働者・技能実習生の就労状況とともに、調査のために行政・産業衛生・臨床の専門家が必要と考えられたため、それら専門家チームを持ち、研究班と速やかに協議に入れると考えられたタイ、インドネシア、フィリピン等についての調査・協議を行うこととした。また、関連情報収集の対象国として外国人労働者の受け入れの先進国として

アメリカ・ドイツなどを対象として選定した。ただ、法制度・産業保健体制・医療提供体制については各国大きな差があることから、調査にあたっては今後さらなる調整が必要と考えられる。

A. 研究目的

全体の研究目的は健康管理手帳制度による健康診断を諸外国で実施するための課題及び解決策を検討することとなっているが、本研究ではその実現のために調査対象となる国の選定と、その調査方法についてまとめることを目的とした。

総括ですでに述べられているように、我が国では一定の健康障害のリスクが予想される者については、離職の際又は離職の後に、労働安全衛生法の規定に基づき、健康管理手帳制度のもと、都道府県労働局長が指定する医療機関において、定期的に健康診断を受診することができることとなっている。これは、我が国で就労する外国人労働者も対象となる。

2019年に施行された改正出入国・難民認定法により、段階的に単純労働分野においても外国人労働者の受け入れを拡大することとなっており、今後、一定期間、我が国で有害業務に従事した後、母国において健康診断の受診を希望する者が増加することが予想される。

このような状況を背景として、健康管理手帳制度に基づく健康診断を行う適切な医療機関等の把握、健康診断の実施方法・課題等について、調査対象となる国の選定と調査内容の詳細について検討を行い、諸外国に対する調査の基礎資料を作成することを目的とした。

B. 研究方法

調査対象国選定のためには、我が国での対象業務における外国人労働者の現状を把握する必要があり、厚生労働省「外国人雇用状況の届け出状況」と 外国人技能実習機構による「令和４年度外国人技能実習機構業務統計」を参考にいずれの国の外国人労働者が多いかを調査した。

そこで挙がってきた対象国を中心に研究者、研究協力者間で協議を行い、実際のカウンターパートとなり得る専門家、組織の選定を行った。

あわせて、日本における技能実習生制度の動向と外国人労働者の健康管理に関する課題等について法務省出入国在留管理庁の技能実習制度および特定技能制度の見直し検討会、及び若干の最近の文献をもとにその概略をまとめた。

調査項目については、まず我が国の健康管理手帳制度における健診対象や健

表１　健康管理手帳の交付状況

業務		交付数
ベンジジン		1,048
β ナフチルアミン		728
石綿取り扱い作業		37,034
粉じん作業	管理２	11,739
	管理３	10,993
クロム酸		695
三酸化砒素		33
コークス		4,828
ビスエーテル		85
ベリリウム		2
ベンゾトリクロリド		9
塩化ビニル		1,869
ジアニジン		186
1･2－ジクロロプロパン		48
オルソトルイジン		55
3･3'-ジクロロ-4･4'-ジアミノジフェニルメタン		0
合計		69,352

診項目、都道府県労働局が医療機関を指定する際の要件などを整理し、対象地域での健康診断実施のために必要と考えられる項目を含めた調査票の作成を行った。

調査票をもとに調査を行うにあたって、調査目的、調査内容などについてカウンターパートに提示する提案書（Proposal）の作成を行った。

C. 研究結果

１．健康管理手帳の交付状況及び外国人労働者の統計

健康管理手帳の発行状況について、表１に示した。それによると粉じん作業と石綿取り扱い作業の労働者が健康管理手帳交付の 86.2%と大多数を占めている。これらの作業の大多数は建築業に分類されているため、本研究のターゲットとしては建築業に従事する外国人労働者が主体と考えられる。

厚生労働省の外国人雇用状況に基づく国籍分布を表２に、外国人技能実習機構業務統計から、外国人技能実習生の国籍分布を表３に示した。特に建築労働者の人数分布についても取り上げ同じ表に示した。

我が国の外国人労働者はアジア圏の国籍者が多く、外国人労働者全体でみると、中国や韓国の労働者も多数認めているが、こと建築労働者として見れば、ベトナム、フィリピン、インドネシアが多く、技能実習生、技能実習生における建築労働者としてもこの３国の労働者は多数を占めていることがわかる。

これらの調査統計を参照して、実際に健康管理手帳の配布される可能性の高い外国人労働者が従事していると想定される調査対象国を選定した。調査対象国の実情を確認するため、各国のカウンターパートとなる海外協力者の選定を行ない、海外の協力者との協議を行った。

表２　外国人雇用の国籍分布

国籍	全産業	建設業
中国	385,848 (21.2%)	12,760 (0.70%)
韓国	67,335 (3.7%)	1,338 (0.07%)
フィリピン	206,050 (11.3%)	13,298 (0.73%)
ベトナム	462,384 (25.4%)	54,099 (2.97%)
ネパール	118,196 (6.5%)	1,295 (0.07%)
インドネシア	77,889 (4.3%)	12,138 (0.67%)
ミャンマー	47,498 (2.6%)	4,551 (0.25%)
ブラジル	135,167 (7.4%)	3,865 (0.21%)
ペルー	31,263 (1.7%)	1,248 (0.07%)
Ｇ７等	81,175 (4.5%)	588 (0.03%)
その他	209,920 (11.5%)	11,609 (0.64%)
全国籍計	1,822,725 (100.0%)	116,789 (6.41%)

表３　外国人技能実習生の国籍分布

国籍	合計	建築関係
ベトナム	124509 (50.6%)	23820 (9.7%)
中国	18346 (7.4%)	1665 (0.7%)
インドネシア	42836 (17.4%)	13545 (5.5%)
フィリピン	22205 (9.0%)	5690 (2.3%)
ミャンマー	14927 (6.1%)	3430 (1.4%)
タイ	6801 (2.8%)	706 (0.3%)
カンボジア	9760 (4.0%)	2722 (1.1%)
モンゴル	2004 (0.8%)	868 (0.4%)
その他	4872 (2.0%)	1456 (0.6%)
全体	246260 (100.0%)	53902 (21.9%)

2. 外国人労働者の健康管理に関する現状や技能実習生の動向

（１）外国人雇用状況の届出制度と技能実習生制度の動向

日本で働く外国人労働者の数は 2023 年 10 月時点で約 204 万人に達し、前年比で約 12.4%の増加を示しており、外国人労働者の数は過去最高を更新している（文献 1)。特に最近では前述の報告の通りベトナム人が最も多い。

厚生労働省は、令和５年 10 月末時点の外国人雇用についての届出状況を取りまとめている。外国人労働者数は初の 200 万人超えとなった。

外国人雇用状況の届出制度は、労働施策の総合的な推進並びに労働者の雇用の安定及び職業生活の充実等に関する法律に基づき、外国人労働者の雇用管理の改善や再就職支援などを目的とし、すべての事業主に、外国人の雇入れ・離職

時に、氏名、在留資格、在留期間などを確認し、厚生労働大臣（ハローワーク）へ届け出ることを義務付けている。

届出の対象は、事業主に雇用される外国人労働者（特別永住者、在留資格「外交」・「公用」の者を除く。）であり、数値は令和５年 10 月末時点で事業主から提出のあった届出件数を集計したものである。

外国人労働者数は 2,048,675 人で前年比 225,950 人増加し、届出が義務化された平成 19 年以降、過去最高を更新し、対前年増加率は 12.4 %と前年の 5.5 %から 6.9 ポイント上昇となった。

外国人を雇用する事業所数は 318,775 所で前年比 19,985 所増加、届出義務化以降、過去最高を更新し、対前年増加率は 6.7 %と前年の 4.8 %から 1.9 ポイント上昇した。国籍別では、ベトナムが最も多く 518,364 人（外国人労働者数全体の 25.3%）、次いで中国 397,918 人（同 19.4%）、フィリピン 226,846 人（同 11.1%）の順であった。

在留資格別では、「専門的・技術的分野の在留資格」が対前年増加率として最も大きく 595,904 人、前年比 115,955 人（24.2%）増加、次いで「技能実習」が 412,501 人、前年比 69,247 人（20.2%）増加、「資格外活動」が 352,581 人、前年比 21,671 人（6.5%）増加、「身分に基づく在留資格」が 615,934 人、前年比 20,727 人（3.5%）増加。一方、「特定活動」は 71,676 人、前年比 1,687 人（2.3%）減少となった。

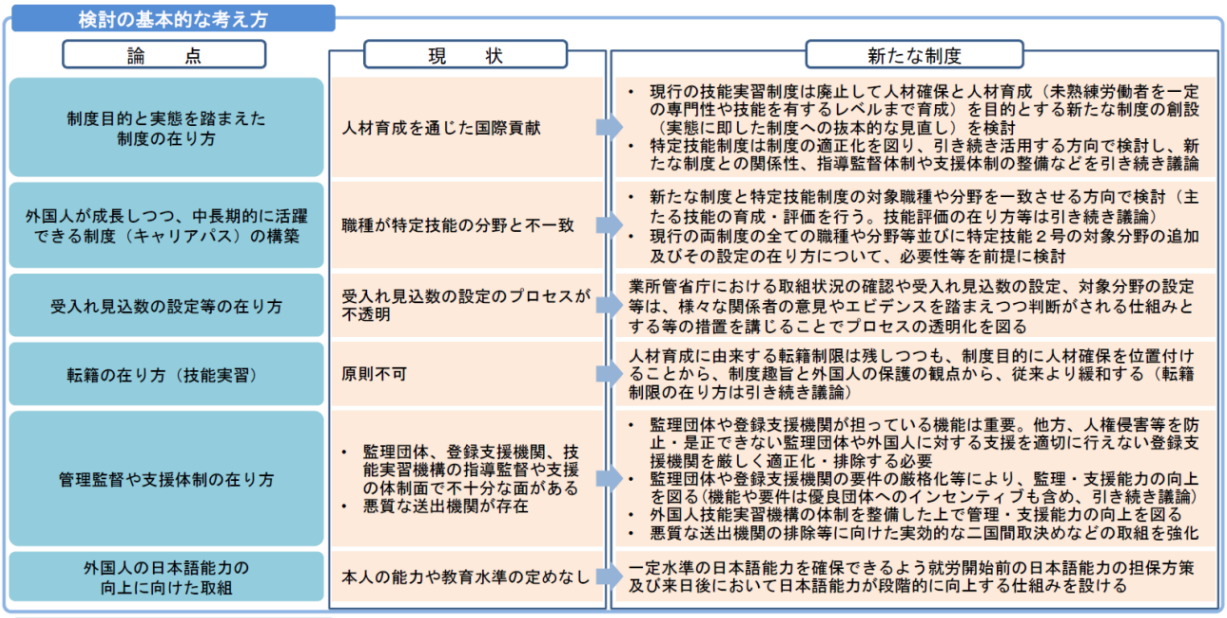
（２）法務省出入国在留管理庁による「技能実習制度・特定技能制度の見直し」

令和 4 年 11 月 22 日に関係閣僚会議の決定に基づき、「技能実習制度及び特定技能制度の在り方に関する有識者会議」が開催され報告書が公開されている(文献 3)。本会議は、両制度の施行状況を検証し、外国人材の適正な受け入れ方策を検討することを目的としている。

技能実習制度は、外国人技能実習の適正な実施及び技能実習生の保護に関する法律（平成 28 年法律第 89 号）に基づき設置され、その施行状況を 5 年ごとに検討することが定められている。特定技能制度も同様に、出入国管理及び難民認定法及び法務省設置法の一部を改正する法律（平成 30 年法律第 102 号）に基づき、施行状況を 2 年ごとに検討することが求められている。

有識者会議では、両制度の運用状況や課題を洗い出し、外国人材の受け入れと共生を進めるための方策を議論している。具体的には、監理団体や登録支援機関の適正化、人権侵害の防止、技能実習機構の体制整備、悪質な送出機関の排除、日本語能力向上の取り組みなどが含まれる。

図１　中間報告書での検討結果概要



中間報告書（令和５年５月 11 日提出）では、深刻な人手不足を背景に、外国人との共生社会の実現を目指し、その人権に配慮しつつ、外国人が日本で働きやすい環境を整えることが強調されている。これにより、多様性に富んだ活力ある社会を実現し、日本の産業及び経済、地域社会を支えることを目指すとされた。有識者会議は、外国人が成長しつつ中長期的に活躍できるキャリアパスの構築、受け入れ見込数の設定や転籍の在り方、管理監督や支援体制の整備などを議論している。これらの議論を踏まえ、令和５年秋に最終報告書を取りまとめた形となった。

図１には中間報告書での検討結果の概要の抜粋を示した。同有識者会議での議論では、制度全体の見直しに関連した内容にとどまり、現在生じている技能習生の人権の問題、健康安全管理の課題などについては記載されておらず、今後検討されるものと思われる。

報告書では、政府は、技能実習制度と特定技能制度の見直しを進める中で、新たな制度の創設を検討しているとした。現行の技能実習制度は、人材確保と育成を目的とした新制度に発展的に解消し、特定技能制度は適正化を図りつつ引き続き活用する方針とされた。

最終報告書では、これらの制度改革を通じて、日本が魅力ある働き先として選ばれる国となることを目指し、外国人労働者がキャリアアップしつつ活躍できる社会の実現に向けた具体的な方策が示されている。

（３）外国人労働者の増加と健康管理の課題

健康管理の面では、外国人労働者が日本の医療システムに適切にアクセスすることが難しいという問題が指摘されている。言語の壁や制度の複雑さが主な障壁となっており、特に低賃金労働者や技能実習生においてその傾向が強い。これらの実態は、今後、継続的に外国人労働者の健康管理を行っていく際に重要な情報となる。

辻村らによる技能実習生の健康や生活上の問題の文献的検討では、①コミュニケーションの間題、②健康の間題、③生活や文化の相違、④労働環境の問題、⑤人権にかかわる問題などが指摘されている（文献 4)。石丸らは外国人技能実習生の監理団体を対象に彼らの健康と安全への支援の状況について調査した（文献５）。監理団体は技能実習生のメンタルヘルス不調、結婚・妊娠・出産、ハラスメントへの相談対応に最も課題を抱えていた。監理団体と産業保健職との連携促進に、教育機会や教育を計画する安全衛生の担当者の存在が重要だとした。

以前から指摘されてきた外国人労働者の健康課題については、その人数の増加と共に、より複雑化している。その中には、日本で働くことによって生じた健康障害を抱えたまま母国に帰国する労働者の存在と、その後のケアの重要性が指摘できる。

3. 提案書（案)、調査票（案）の作成

調査項目としては各国の保健医療制度には大きな差異があるため、各国の法制度、産業保健体制、医療提供体制、我が国の健康管理手帳制度に合致する医療機関・専門家について、またそういった産業保健・医療サービスの品質管理についてのシステムについて包括的に調査することとした。この目的を達するために、参考資料につけた本研究を理解してもらうための提案書、調査票を作成した。

D. 考察

対象国の選定に当たり、最終的には健康管理手帳制度交付に該当する外国人労働者が来日している国全体に対する調査も必要になるが、調査の結果、すでにある程度の人数来日があること、また、調査のためには法制度・行政の視点、産業衛生の視点、医療現場の視点など幅広い視点が必要であることから、そういった専門家を擁している国を当初の調査対象とすることとした。具体的にはタイ、インドネシア、フィリピン、ネパールの専門家との協議に入り、質問票、質問項目の修正もしながら、その他のアジアの国での調査についての知見も収集しているところである。

また、労働者受け入れ側の調査も必要

と考えられ、アメリカ、ドイツなど受け入れが進んでいると考えられる国への調査も検討している。

E. 結論

調査票など作成を行い、調査の準備を整えたものの、法制度・産業保健体制・医療提供体制については各国大きな差があることから、実際の調査にあたっては今後さらなる調整が必要と考えられる。

F. 健康険情報

該当なし

G. 研究発表

該当なし

H. 知的財産権の出願・登録状況(予定を含む)

1.特許取得

該当なし

2.実用新案登録

該当なし

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To

[Details of recipient]

Subject: Proposal for Overseas Health Checkup Initiative

Name of the Research Project:

Assessing the Feasibility of Extending Occupational Health Services to Returning Overseas Workers: A Collaborative Study.

Principal Investigator:

Narufumi Suganuma, MD, PhD
Professor and Chief, Department of Environmental Medicine
Kochi Medical School, Kochi University
Former Dean of Kochi Medical School

Funding Agency:

Ministry of Health, Labour and Welfare, Government of Japan

Timeframe of the Research:

3 April 2023 to 31 March 2026

Section I. Overview of the Research Project

Introduction

The Ministry of Justice of Japan reported approximately 1.66 million foreign workers in 2019, including technical intern trainees comprising roughly 23% (384,000 individuals) of the total workforce, who typically return to their home countries upon completing their internships. Furthermore, the revised Immigration and Refugee Recognition Act, effective in 2019, signals a gradual expansion of foreign worker acceptance in Japan.

In Japan, individuals engaged in occupations with potential health hazards, such as those prone to developing cancer, are issued Notebooks of Personal Health Record upon leaving employment. Governed by the provisions of the Industrial Safety and Health Law and specific requirements outlined by the Ministry of Health, Labour and Welfare, these Notebooks grant access to regular medical assessments at designated institutions, extending coverage to both Japanese nationals and qualifying foreign workers. However, as of present, this service is exclusively available at designated medical facilities within Japan.

Anticipating a desire among individuals to undergo medical examinations in their home countries after exposure to hazardous substances in Japan, it is imperative to assess the feasibility of extending health assessment services to returning foreign workers. We hypothesize that such an extension will not only address critical healthcare gaps but also enhance overall well-being strategies for returning workers.

Hence, the primary objective of this research project is to evaluate, in collaboration with relevant overseas partners, the feasibility of extending health assessment services to foreign workers returning to their home countries after employment in Japan.
Specifically, the research aims to:

- Identify gaps in providing health examinations to foreign workers after returning to their home countries.

- Investigate the availability of medical institutions capable of providing health examination services at a standard comparable to that of Japan.

Methodology

1. Ethical Considerations

Before commencing this research, we will consult the Institutional Review Board at Kochi Medical School, Kochi University, Japan, regarding ethical issues such as consent and the handling of information.

2. Study Design

We will use a mixed-methods approach, combining document review and focus group interviews with ministerial and occupational healthcare personnel.

3. Participants

We purposively select participating countries from those with a large number of technical intern trainees currently visiting Japan, primarily from Southeast Asian countries, along with other major countries with bilateral agreements on technical intern training or arrangements on specific skills.

Countries with a significant number of technical intern trainees in Japan, listed in decreasing order, include Viet Nam, China, Indonesia, the Philippines, Myanmar, Thailand, and Cambodia.

Countries with bilateral agreements on technical intern training or arrangements on specific skills encompass Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand, Uzbekistan, and Viet Nam.

4. Data Collection

- Document reviews of occupational health services, with a particular focus on health examinations, will be conducted by respective collaborators from each participating country. The documents review is divided into three sections to

provide a comprehensive snapshot of occupational health service in each participating country: (1) the governance of occupational health service, (2) quality assurance of occupational health service, and (3) review of medical institutions providing occupational health service, particularly health examination service.

- We designed a mixed survey questionnaire, incorporating both open- and closed-ended questions, after reviewing existing literature. Using this questionnaire, we will conduct focus group interviews with healthcare personnel from each participating country. These interviews aim to explore essential elements of occupational health service delivery, with a specific focus on health examinations in each participating country. The number of participants in each country will be determined through a review of medical institutions providing occupational health service.
- Hold international meetings with participation of research collaborators (ministerial and occupational healthcare personnel) from the countries under study to gain in-depth insights into the occupational healthcare system and standards.

5. *Data Analysis*

   Summarize close-ended responses using descriptive statistics and thematically analyzed open ended responses.

6. *Dissemination of results*

   After conducting a three-year survey and study, the current status of occupational health services, with a specific focus on health examinations in each country, will be thoroughly organized and summarized. Additionally, proposals addressing future study areas related to the implementation of health examinations in participants' home countries will be compiled into a comprehensive report.

   These findings will also be documented in prominent Asian academic journals such as the Journal of Occupational Health, Industrial Health, and Environmental

Occupational Health Practice, among others, which specialize in occupational health.

Timeframe

Significance of the research

The increasing influx of foreign workers into Japan, particularly technical intern trainees, underscores the pressing need to address their healthcare needs, especially upon their return to their home countries. For instance, approximately 35% of these trainees are engaged in construction, machinery and metal industries, occupations prone to exposure to hazardous substances, highlighting the potential health risks they face during their employment in Japan. Despite the issuance of Notebooks of Personal Health Record by the Ministry of Health, Labour and Welfare in accordance with the Industrial Safety and Health Law, the current system lacks provisions for health examinations upon the workers' return to their home countries. Given that occupational hazards may continue to manifest long after cessation of work, the continuity of health assessments for returning workers is imperative.

This research holds profound significance in bridging this gap by evaluating the feasibility of extending health assessment services to overseas workers in their home countries. By identifying medical institutions capable of providing comprehensive health examinations in countries with significant numbers of returning workers, this study aims to establish a crucial foundation for enhancing measures related to the Notebooks of Personal Health Record for foreign workers. The findings from this research will not only contribute to the well-being of returning overseas workers but also inform policy decisions aimed at safeguarding their health and promoting international occupational health standards.

Moreover, the establishment of networks and collaborations with medical institutions abroad will not only facilitate continuous health monitoring for returning workers but also foster cross-border cooperation in addressing occupational health challenges. Ultimately, this research has the potential to advance global efforts in ensuring the health and safety of migrant workers, thereby fostering inclusive and equitable healthcare systems worldwide.

Section II. Responsibilities of Participating Countries

1. Conduct a comprehensive document review and submit findings to the principal investigator by August 2024. The document review will be divided into three sections to provide a detailed overview of occupational health services in each collaborating country:
    - Governance of occupational health services
    - Quality assurance of occupational health services
    - Review of medical institutions providing occupational health services, with a focus on health examination services.
2. Organize and facilitate focus group interviews with key healthcare personnel to explore critical aspects of occupational health service delivery. These interviews will provide valuable insights into the strengths, challenges, and opportunities for improvement within each country's occupational health system.

3. Actively participate in international meetings convened with relevant ministerial and occupational healthcare personnel. These meetings will serve as platforms for sharing knowledge, exchanging best practices, and gaining a deeper understanding of the occupational healthcare systems and standards in each collaborating country. By engaging in these discussions, participating countries can contribute to the development of collaborative solutions and the advancement of the oversea health checkup initiative for returning workers.

Section III. Merits for Participation in this Project

1. Facilitating collaboration between medical institutions in foreign countries and Japan will foster a culture of continuous improvement in the standard of health examination services. This collaborative effort not only benefits returning overseas workers but also extends to Japanese workers deployed in these countries, who can access these institutions for medical examinations. By leveraging the expertise and resources of both domestic and international healthcare providers, participating countries can enhance the quality and accessibility of occupational health services, thereby promoting the well-being of workers across borders.
2. Participating countries will receive a financial incentive of thirty thousand Japanese Yen or equivalent currency for each component of the document review, including:

    - Governance of occupational health services
    - Quality assurance of occupational health services
    - Review of medical institutions providing occupational health services, with a specific focus on health examination services.

    This monetary reward not only acknowledges the valuable contribution of participating countries to the research endeavor but also serves as an incentive for thorough and timely completion of the document review process. Additionally, by providing financial support, this initiative demonstrates a commitment to fostering

international collaboration and advancing occupational health standards on a global scale.

3. In acknowledgment of their collaboration in the research, representatives or individuals in charge from each participating country will be acknowledged and included as co-authors in the final report.

Oversea Health Checkup Initiative for Returning Overseas Workers

In Japan, we have a system that provides the personal **Health Handbook** to individuals engaged in jobs that may pose health risks, such as the development of cancer, and who meet the requirements specified by the Order of the Ministry of Health, Labor and Welfare of Japan upon leaving their employment. Those in possession of the handbook are entitled to undergo regular medical assessments at designated medical institutions.

This system is applicable to both Japanese nationals and foreign workers who meet the aforementioned conditions. However, the services are currently only available at medical institutions in Japan. Our research group aims to evaluate the feasibility of extending health assessment service to foreign workers who have returned to their home countries.

This study is supported by the Ministry of Health, Labor and Welfare, and it will report on the research results regarding the implementation status of health assessment programs, particularly those related to pneumoconiosis, in Asian countries. These research findings are expected to be crucial inputs for the Ministry of Health, Labor and Welfare when formulating future healthcare strategies for foreign workers.

Your understanding of the purpose of this study is greatly appreciated.
Please check one of them.

☐ I will cooperate. ☐ I will not cooperate.

Date: ……..

Questionnaire A. We would like to inquire about the Occupational Health Service (OHS) Delivery System, with a particular focus on health examination in your country.

Section 1. *General Information*

1.1. Your Name

1.2. Position/Title

1.3. Name of your Organization/Agency

Section 2. *We would like to inquire about the legislations/law enforcements for the occupational health and safety.*

2.1. Is there a specific legislation or law governing occupational health and safety in your country? Example: Industrial Safety and Health Law of 1972 in Japan.

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

2.2. Is there a regulatory body responsible for enforcing occupational health and safety laws in your country? Example: The Ministry of Health, Labour and Welfare (MHLW) in Japan oversees and enforces occupational health and safety regulations.

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

2.3. Are there specific requirements outlined in the legislation regarding occupational health management? Example: Industrial Safety and Health Law in Japan, which mandates the appointment of an Occupational Health Physician (Chapter III. Article 13).

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

2.4. How are companies monitored or assessed for compliance with occupational health and safety laws in your country? Example: Regular audits conducted by regulatory authorities to ensure adherence to occupational health and safety regulations.
If any, please describe.

_____

_____

_____

2.5. Do occupational health and safety laws in your country include provisions for employee rights and protections? Example: Employees have the right to receive period health examination at no cost.

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

Section 3. *We would like to inquire about the occupational health service, with a particular focus on health examinations in general.*

3.1. How frequently are medical examinations conducted for employees?

- ☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years

- ☐ Never Conducted

- Others (please specify): _____

3.2. Are there any public post-retirement health care programs for employees?

☐ Yes ☐ No ☐ Not sure

3.3. *If "yes" to Q:3.2. How frequently are medical examinations conducted for retired employees?*

- ☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years
- ☐ Never Conducted
- Others (please specify): _____

3.4. Are there any private post-retirement health care programs for employees?

☐ Yes ☐ No ☐ Not sure

3.5. If "yes" to Q:3.4. How frequently are medical examinations conducted for retired employees?

- ☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years
- ☐ Never Conducted
- Others (please specify): _____

3.6. Does your country have hospitals dedicated to occupational health service?

- Are there any public hospitals with dedicated occupational health department/unit?

☐ Yes ☐ No ☐ Not sure

If "yes" please check the appropriate box below.

Available ☐ only in capital city, ☐ in some major cities, ☐ in small cities,

etc. _____

- Are there any private hospitals with occupational health physicians/nurses?

  ☐ Yes ☐ No ☐ Not sure

  If "yes" please check the appropriate box below.

  Available ☐ only in capital city, ☐ in some major cities, ☐ in small cities,

  etc. _____

3.7. Types of occupational health professionals employed:

- ☐ Occupational health doctors
- ☐ Occupational health nurses
- Others (please specify): _____

3.8. Are the occupational health professionals adequately trained and certified, such as holding post-graduate degrees?

☐ Yes ☐ No ☐ Not sure

3.9. What are the types of occupational health service available in your country?

- ☐ In-house, *i.e.,* occupational health personnel (physicians/nurses) are employed by individual companies.
- ☐ External, *i.e.,* an external unit (health checkup agencies) serving several companies.

- Others (please specify): _____

3.10. Who pays occupational health service fees in your country?

- ☐ Partly paid by public sources
- ☐ Companies
- ☐ Out-of-pocket
- Others (please specify): _____

3.11. How well is the occupational health service integrated into the overall health system of the country?

☐ Well-integrated ☐ Partially integrated ☐ Not integrated ☐ Not sure

Section 4. *We would like to inquire about the legal and healthcare system for workers engaged in* ***hazardous work*** *in your country.*

4.1. For ***pneumoconiosis*** *and* ***asbestos-related diseases****, is there any public healthcare or health examination system for the workers?*

☐ Yes ☐ No ☐ Not sure

- *If yes to Q:4.1, how frequently are medical examinations for* ***pneumoconiosis*** *performed?*

☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years

Others (please specify): _____

- *If yes to Q:4.1, what are the items in the medical examination for* ***pneumoconiosis****?*
  Please specify those items.

_____

_____

_____

- *If yes to Q:4.1, how frequently are medical examinations for **asbestos-related diseases** performed?*

  ☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years

  Others (please specify): _____
- *If yes to Q:4.1, what are the items in the medical examination for **asbestos-related diseases**?*

  Please specify those items.

  _____

  _____

  _____

*4.2. For pneumoconiosis and asbestos-related diseases, are there any **post-retirement** healthcare programs for the workers?*

☐ Yes ☐ No ☐ Not sure

- *If yes to Q:4.2, how frequently are **post-retirement** medical examinations for **pneumoconiosis** performed?*

  ☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years

  Others (please specify): _____
- *If yes to Q:4.2, what are the items in the **post-retirement** medical examination for **pneumoconiosis**?*

  Please specify those items.

  _____

  _____

  _____

- *If yes to Q:4.2, how frequently are **post-retirement** medical examinations for **asbestos-related diseases** performed?*

  ☐ Every 6 Months ☐ Annually ☐ Every 2 years ☐ Every 3 years

  Others (please specify): _____

- *If yes to Q:4.2, what are the items in the **post-retirement** medical examination for **asbestos-related diseases**?*

  Please specify those items.

  _____

  _____

  _____

*4.3. For workers currently engaged in occupations with exposure to known **carcinogens** (other than silica and asbestos) such as benzidine, Beta-naphthylamine, etc., is there any public healthcare or health examination system in your country?*

☐ Yes ☐ No ☐ Not sure

*4.4. For workers previously engaged in occupations with exposure to known **carcinogens** (other than silica and asbestos) such as benzidine, Beta-naphthylamine, etc., is there any public healthcare or health examination system in your country?*

☐ Yes ☐ No ☐ Not sure

***Section 5.** We would like to inquire about health examination through the Health Handbook system for your citizens after employment in Japan.*
If there is a request from Japan for post-retirement medical examinations for pneumoconiosis and asbestos-related diseases for your citizens after employment in Japan:

5.1. Are there any physicians able to evaluate pneumoconiosis and asbestos-related diseases?

☐ Yes ☐ No ☐ Not sure

5.2. Are there any physicians able to classify chest radiographs for pneumoconiosis according to the International Labour Office (ILO) international classification system (or) similar classification system for pneumoconiosis?

☐ Yes ☐ No ☐ Not sure

5.3. Are there any medical institutions, public or private, in your country that employ specialists who can diagnose pneumoconiosis and asbestos-related diseases?

☐ Yes ☐ No ☐ Not sure

5.4. If yes to Q:5.3, how many medical institutions in your country that employ specialists who can diagnose pneumoconiosis and asbestos-related diseases?

a. Public medical institution

☐ One facility in the country (e.g., located in capital city)

☐ Located in major cities (only in some prefectures)

☐ Located in small cities (all prefectures)

b. Private medical institution

☐ One facility in the country (e.g., located in capital city)

☐ Located in major cities (only in some prefectures)

☐ Located in small cities (all prefectures)

5.5. Are there any medical institutions, public or private, in your country that can provide the following investigations?

a. Digital chest radiography (CXR)

b. Computed tomography
c. Spirometry and flow volume curves examination
d. Bronchoscopy
e. Arterial blood gas analysis
f. Sputum smear test for tuberculosis
g. Tuberculin test
h. Interferon gamma release test
i. Sputum cytology examination
j. Blood sedimentation

☐ Yes ☐ No ☐ Not sure

5.6. *If yes to Q:5.5, how many medical institutions in your country that can provide investigations listed in Q:5.5?*

a. Public medical institution

☐ One facility in the country (e.g., located in capital city)

☐ Located in major cities (only in some prefectures)

☐ Located in small cities (all prefectures)

b. Private medical institution

☐ One facility in the country (e.g., located in capital city)

☐ Located in major cities (only in some prefectures)

☐ Located in small cities (all prefectures)

Questionnaire B: We would like to inquire about the Quality Assurance System for Occupational Health Service, with a particular focus on health examination in your country.

1. Does your country have legislations/regulations for quality assurance on occupational health service?

1.1. Are organizations required to apply to the authorities for permission to establish an occupational health service facility or clinic?

☐ Yes ☐ No ☐ Not sure

1.2. Are there specific measures in place to ensure the standardization of health examinations for occupational diseases?

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

- Example: Japan has established standards for pneumoconiosis health examinations, as outlined in the Handbook of Pneumoconiosis Health Examination.

1.3. Are there specific medical examination schemes for workers exposed to hazardous substances, such as asbestos?

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

- Example: Japan's Ministry of Health, Labour and Welfare has implemented a medical examination scheme for asbestos-exposed workers.

1.4. Are there standards for diagnostic tools, such as radiographs, used in occupational disease investigations?

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

- Example: Japan has set standards for digital radiography to ensure consistency in pneumoconiosis diagnosis.

1.5. How do regulatory bodies contribute to quality assurance in occupational health services?

Please provide details.

_____

_____

_____

- Example: Industrial safety and Health Department play a key role in overseeing and ensuring compliance with quality assurance standards.

2. Is there a formal quality assurance system in place for occupational health services? For examples:

2.1. Accreditation System.

Example: Hospitals providing occupational health services are required to undergo accreditation, demonstrating compliance with predefined quality standards.

☐ Yes ☐ No

2.2. Standardization of Investigations.

Example: Quality assurance is ensured through standardized procedures, such as interpreting chest radiography for pneumoconiosis using the ILO classification system, to maintain consistency and accuracy in diagnostic processes.

☐ Yes ☐ No

2.3. Continuous Monitoring and Improvement.

Example: A continuous monitoring system is in place, with regular assessments and feedback mechanisms to identify areas for improvement in occupational health services.

☐ Yes ☐ No

2.4. Compliance Audits.

Example: Regular audits are conducted to ensure that occupational health services comply with established regulations and quality standards.

☐ Yes ☐ No

2.5. External Quality Assurance Programs.

Example: Participation in external quality assurance programs, where occupational health services are evaluated by independent organizations to validate the quality of services such as radiological images and blood/laboratory tests.

☐ Yes ☐ No

2.6. ☐ No Formal System in Place. Example: Currently, there is no established formal system for quality assurance in occupational health services.

2.7. ☐ Not Sure/Not Applicable:

3. If "yes" to any of the items in Q:2, how often are evaluations conducted to assess the quality of occupational health services?

- ☐ Every 6 Months ☐ Annually ☐ Every 2 or 3 years
- ☐ Continuous Monitoring and Feedback Loop
- ☐ Post-Incident Evaluations. Example: After significant incidents or outbreaks, immediate evaluations are conducted to analyze the effectiveness of the response and identify lessons learned.
- ☐ Upon Introduction of New Policies or Procedures. Example: Evaluations are conducted whenever new policies, procedures, or technologies are introduced to ensure their effectiveness in improving occupational health services.
- ☐ As Needed/On an Ad-hoc Basis

4. Is it mandatory for healthcare professionals to obtain permission or certification from the authorities to practice occupational health services in your country?

☐ Yes ☐ No ☐ Not sure

5. Does your country have certification programs for occupational health physicians and occupational health nurses?

☐ Yes ☐ No ☐ Not sure

If yes, please provide details or examples.

_____

_____

_____

6. Is it possible to obtain anonymized chest images (in DICOM format) for use in this research?

☐ Yes ☐ No ☐ Not sure

令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

健康管理手帳制度による健康診断のタイでの実施のための研究

研究分担者:JP Naw Awn　高知大学　医学部　特任助教
研究代表者:菅沼　成文　全国労働衛生団体連合会
胸部X線検査専門委員会委員
研究分担者:田村太朗　島根大学　医学部　准教授

研究要旨

【目的】

研究代表者らは、2003 年からタイ政府関係者との間でじん肺読影医認証制度の議論を開始し、2008 年にバンコクでアジアじん肺読影医養成プログラム（AIR Pneumo）を始動し、以来 2023 年までにタイで 7 回、全体で 26 回開催してきた。AIR Pneumo を通じて培った人的ネットワーク等を土台として、タイの労働安全衛生分野の専門家（省庁、大学、国営医療機関）と共に移民労働者が帰国後に健康管理手帳制度の健康診断を受診できるよう研究プロポーザルを作成し、多数の国を対象とする本事業におけるロールモデルを構築することを目指した。

【方法】

タイを訪問し、労働安全衛生分野の専門家を招集して、移民労働者が帰国後に健康管理手帳制度による健康診断を受診することができるよう、研究プロポーザルのドラフト版について議論した。

【結果】

国ごとに異なる会計年度や省庁／規制機関の存在、アンケート調査における倫理委員会（IRB）の必要性、タイでの IRB 承認にかかる時間の長さ、胸部 X 線画像収集の難しさが明らかにされた。

【考察】

プロジェクト提案においては、明確な目的設定と協力国への責任分担が重要であることが示唆された。タイでの IRB 承認にかかる時間の長さを考慮して、データ収集の方法論として IRB 承認が不要なフォーカスグループインタビューを採用する。

A. 研究目的

タイは、面積 513,100 平方キロメートルの東南アジアのインドシナ半島に位置する国家で、71.8 百万人の人口を抱える。インドシナ半島の国家群の中では最も GDP の大きな国で、観光業や製造業が主要な経済の柱となっている。医療制度も比較的整備されており、バンコクや主要都市では高水準の医療サービスが提供されているが、地方ではインフラが不

十分な場合もある。
研究代表者らのチームは、じん肺を撲滅するための ILO・WHO による包括的施策に寄与することを目的に、2003 年、タイ政府関係者との間でじん肺読影医の認証制度について議論を開始し、2008 年にバンコクで第一回アジアじん肺読影医養成プログラム（AIR Pneumo）を実施し、現在までアジア等の地域で合計 26 回（内、タイは最多の 7 回）開催してきた。この AIR Peumo の取組の中で形成されたネットワークと比較的発展した医療制度を土台とし、移民労働者が帰国後に健康管理手帳制度による健康診断を受診することができるように、タイの労働安全衛生分野の専門家と共に研究プロポーザルを作成し、多数の国を対象とする本事業におけるロールモデルを構築することが本調査の目的である。

B. 研究方法

タイを訪問し、労働安全衛生分野の専門家（省庁、大学、国営医療機関）を招集して、移民労働者が帰国後に健康管理手帳制度による健康診断を受診することができるよう、研究プロポーザルのドラフト版について議論した。

日時：2024 年 2 月 5 日
場 所 ： Grand Richmond Stylish Convention Hotel
会議出席者：
[Division of Occupational and Environmental Diseases, Department of Disease Control, Ministry of Public Health]（省庁）
Dr. Somkiat Siriruttanapruk, Senior advisor
Dr. Yongjua Laosiritaworn, M.D., Ph.D., Director
Dr. Thanawat Rattanawitoon, Head
Dr. Wipada Senanon, Public Health Technical Officer

[Raj Pracha Samasai Institute, Department of Disease Control, Ministry of Public Health]（省庁）
Dr. Ueampohn Poonkla, M.D., M.Sc., Occupational Medicine Physician
Dr. Suttinate Wannatrong, M.D., M.Sc., Occupational Medicine Physician

[Department of Preventive and Social Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University]（大学）
Dr. Narongpon Dumavibhat, M.D., Ph.D. Assistant Professor

[Department of Community and Family Medicine, Faculty of Medicine, Thammasat University]（大学）
Dr. Sitthiphon Bunman, M.Sc., Ph.D.

[Department of radiology, Central Chest Institute of Thailand]（国営医療機関）
Dr. Saijai Lertrojanapunya, M.D.
Dr. Sutarat Tungsagunwattana, M.D.

JP Naw Awn　高知大学医学部環境医学教室
角田都　　高知大学医学部環境医学教室

C. 研究結果

会議参加者より、以下の点について指摘を受けた。

- 国ごとに異なる会計年度
- 国ごとに異なる省庁／規制機関が存在
- アンケート調査に関しては倫理委員会（IRB）の承認が必要
- フォーカスグループインタビューに関しては IRB の承認が不要
- タイでの IRB 承認には 8 ヶ月以上かかる可能性がある
- 胸部 X 線画像の取得が非常に困難であることが示唆されており、IRB の期間を考慮する必要がある

D. 考察

会議で議論された内容を踏まえ、以下の点が課題として浮かび上がってきた。

- プロジェクトの提案に関しては、明確な目的を特定し、協力国に対する明確な責任を定めることが重要であることが示唆された
- タイでの国際会議開催については、早急な行動が必要でないとされた
- タイでの IRB 承認にかかる時間が長いため、計画にはそれを考慮する必要がある

E. 結論

タイでの IRB 承認にかかる時間の長さを考慮して、データ収集の方法論として IRB 承認が不要なフォーカスグループインタビューを採用する。タイでの健康管理手帳制度による健康診断プロジェクトに関して、タイでの実施方法として、共同研究者の採用や奨学金の可能性、別の報告書／出版物の作成が提案された。本調査を通じて、タイでの調査を進める上で必要となる連絡担当候補者を立てることができた。タイにおける OSH サービスの提供システム及び品質保証システムについての文献調査、健康診断実施病院候補リストの収集、病院調査の実施は次年度以降の課題となった。

F. 健康危険情報

該当なし

G. 研究発表

1. 論文発表

J-P NA, Susanto AD, Samoedro E, Mansyur M, Tungsagunwattana S, Lertrojanapunya S, Subhannachart P, Siriruttanapruk S, Dumavibhat N, Algranti E, Parker JE, Hering KG, Kanayama H, Tamura T, Kusaka Y, Suganuma N. Asian Intensive Reader of Pneumoconiosis program: examination for certification during 2008-2020. Industrial Health 2024. 62, 143–152. DOI: 10.2486/indhealth.2023-0010

2. 学会発表

［International meeting］

1. Indriyati LH , Eitoku M, Naw Awn J-P , Nishimori M, Hamada N, Sawitri N, Suganuma N

Assessment of Chest Ray Profile in Relation to Prevalence of Silicosis aming Tuberculosis Patients in West Java, Indonesia,34th International Congress on Occupational Health (ICOH), Marrakesh, Morocco, April 2024

［National meeting］

1. Indriyati LH, Eitoku M, Naw Awn J-P, Nishimori M, Hamada N, Sawitri N, Suganuma N

Prevalence of Radiographic Silicosis among Tuberculosis patients in West Java, Indonesia: Preliminary report from Hospital Based Study . The 67th Chugoku-Shikoku Joint Conference on Occupational Health 第 67 回中国四国合同産業衛生学会本, Ehime, December 2023

2. Indriyati LH, Eitoku M, Naw Awn J-P, Nishimori M, Hamada N, Sawitri N, Suganuma N

Prevalence of Radiographic Silicosis Among Tuberculosis Patients in West Java, Indonesia

94th Annual Meeting of Japan Society for Hygiene, Kagoshima, March 2024

3. Indriyati LH , Eitoku M, Naw Awn J-P , Nishimori M, Hamada N, Sawitri N, Suganuma N

Prevalence of Radiographic Silicosis Cases among MDR-TB and DS-TB patients in Indonesia.

97th Annual Meeting of Japan Society for Occupational Health, 第 97 回日本産業衛生学会, Hiroshima, May 2024

H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得

該当なし

2. 実用新案登録

該当なし

令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

健康管理手帳制度による健康診断のインドネシアでの実施のための研究

研究協力者：梶木　繁之　産業医科大学，産業保健コンサルティングアルク
研究協力者：Nuri Purwito Adi　産業医科大学，インドネシア大学
研究協力者：Dr Muchtaruddin Mansyur（Dr MM），インドネシア大学

研究要旨

【目的】

インドネシアは、東南アジア諸国の中核的な国で、世界の人口でも第 4 位を占める大国である。 若年層の人口の増加により、今後も国全体の人口の増加が見込まれている。我が国の外国人労働者に占める割合も上位に位置し、今後は技能実習生としての渡航者のさらなる増加も見込まれる。本調査は、インドネシアからの渡航労働者が、日本国内において有害業務（特にじん肺関連作業）に暴露し、その後母国に帰国した後に、健康障害の発生の有無を確認する現地国での健康診断（日本国内での健康管理手帳制度による健康診断に該当）の実現可能性について検討するために、インドネシアの労働安全衛生（OSH）制度の現状を明らかにすることを目的とした。

【方法】

インドネシアの OSH 制度（特にじん肺に関連するインドネシア国内での特殊健康診断の実施体制並びに特殊健康診断の実施に必要な医療設備等）の現状について、現地国の研究協力者の協力のもと予備調査を行った。

【結果】

今回の予備調査の結果より、インドネシア国内においては、本研究の目的を果たすために必要となる一定の人材や医療設備並びに医療機関の存在の可能性が示唆された。ただし、現地国内で具体的に本取り組みを進める際には、より詳しい情報の入手が必要と思われた。

【考察】

この調査では、インドネシア国内での特殊健康診断（じん肺健康診断）が法令によって行われていないことが確認された。しかし、日本のじん肺検診に類似した健康診断をインドネシアで行うことは可能であると示唆された。本研究はインドネシア大学の専門家を対象に実施した予備調査の一部であり、今後日本から帰国した労働者に対する特殊健康診断の実施には、対象者の特定、受診可能な医療機関と専門的な診断を行える医師の確保、それらに係る費用に関する詳細な検討が必要であると考えられた。

A. 研究目的

インドネシアは、東南アジア諸国の中核的な国で、世界の人口でも第4位を占める大国である。若年層の人口の増加により、今後も国全体の人口の増加が見込まれている。我が国の外国人労働者に占める割合も上位に位置し、今後は技能実習生としての渡航者のさらなる増加も見込まれる。

研究協力者は 2010 年頃より、日経企業の海外事業場における労働安全衛生活動のサービスの質の向上を目的とした様々な取り組みを展開しており、その一環として労働安全衛生マネジメントシステム(OHSMS) を活用したモデルの導入とその有効性の検証を、インドネシア国内での事業場とインドネシア大学医学部産業医学部門の協力のもと行ってきた。

今回、上記の取り組みの過程を通じて形成した現地国との協力体制を活用し、インドネシアからの渡航労働者が、日本国内において有害業務(特にじん肺関連作業)に暴露し、その後母国に帰国した後に、健康障害の発生の有無を確認する、現地国での健康診断(日本国内での健康管理手帳制度による健康診断に該当)の実現可能性について検討するため、インドネシアの労働安全衛生(OSH)制度の現状を明らかにすることを目的とした。

B. 研究方法

これまでの共同研究の過程を通じて構築したインドネシア大学医学部産業医学部門の関係者とのネットワークを活用し、本研究での取り組みの概要について口頭にて直接説明を行った。

インドネシア大学側の窓口は、インドネシア大学産業医学部門の教授である Dr MM に依頼し、説明は 2023 年 11 月 22 日~25 日の 4 日間にわたり、韓国 の大邱で開催された、アジア産業保健学会 (Asian Congress on Occupational Health: ACOH) の場において行った。

研究への同意が得られた後、 研究班で作成した現地国へのアンケート調査票（英文）を用いて、インドネシア国内での労働安全衛生活動(特にじん肺に対する特殊健康診断の実施体制並びに医療機関の有無など)に関する予備調査を行った。(回答は、現地国の研究協力者に依頼した)

C. 研究結果

アンケート調査票を用いた予備調査の結果は、以下の通りである。

Indonesia report from Prof. MM, Dr Nuri

Questionnaire

Please answer the following questions.

1. We will ask for your team's basic information.

1) What country are you a team from?

Indonesia

2) Enter your name, position title, and specialty.

Administrative and legal personnel (eg., people from Ministry of Health): _____

Medical Doctor (Occupational Health physician): _____

Medical Doctor (Pulmonologist or Radiologist):

Others: _____

Muchtaruddin Mansyur, Medical Doctor (Occupational Health Physician), Professor at the University (Universitas Indonesia)

2. We would like to ask you about the legal and occupational health system of health care for hazardous work in your country.

1) For pneumoconiosis and asbestos-related diseases, is there any public health care or health checkup system for the workers?

a. Yes **b. No** c. don't know

2) This question is for those who answered "yes" to 1). How often are health checkup for pneumoconiosis performed?

a. Twice a year or more
b. 1 time a year
c. 1 time in 2 years
d. less than 1 time in 2 years
e. Others:

3) This question is for those who answered "yes" to 1). What are the examination items in the health checkup for pneumoconiosis?

Write down the items of examination:_

4) This question is for those who answered "yes" to 1). How often are health checkup for asbestos-related diseases performed?

a. Twice a year or more
b. 1 time a year
c. 1 time in 2 years
d. less than 1 time in 2 years
e. Others:

5) This question is for those who answered "yes" to 1). What are the examination items in the health checkup for asbestos-related diseases?

Write down the items of examination: _____

6) For pneumoconiosis and asbestos-related diseases, are there any public **post-retirement** health care program for the workers?

a. Yes **b. No** c. don't know

7) This question is for those who answered "yes" to 6). How often are **post-retirement** health checkup for pneumoconiosis performed?

a. Twice a year or more
b. 1 time a year
c. 1 time in 2 years
d. less than 1 time in 2 years
e. Others

8) This question is for those who answered "yes" to 6). What are the examination items in the **post-retirement** health checkup for pneumoconiosis?

Write down the items of examination:_____

9) This question is for those who answered "yes" to 6). How often are **post-retirement** health checkup for asbestos-related diseases performed.

a. Twice a year or more
b. 1 time a year
c. 1 time in 2 years
d. less than 1 time in 2 years
e. Others

10) This question is for those who answered "yes" to 6). What are the examination items in the **post-retirement** health checkup for asbestos-related diseases?

Write down the items of examination: _____

11) If there is a request from Japan for post-retirement health checkups for pneumoconiosis and asbestos-related diseases for the workers, are there any medical institutions that can provide them based on the systems required of medical institutions in Questions 3) and 4)?

a. Yes b. No c. don't know

(We have medical institutions for advance

screening for pneumoconiosis and asbestos-related disease, but we haven't have regulation related on it and refer to Question no. 3 and 4)

12) This question is for those who answered "yes" to question 11). What is the name of the medical institution, address, name of the physician, contact information (email address), etc.

The name of the medical institution: Universitas Indonesia Hospital, Universitas Indonesia

Address: Universitas Indonesia Campuss, Depok, West Java, Indonesia

Doctor's name: Dr. Dewi Yunia Fitriani, Occ.Med Physician

Contact information (E-mail, etc): dewi.yunia.fitriani@gmail.com. Mobile Phone: +628118503727

3. We would like to ask you about the healthcare supply system in your country.

1) We will ask about the diagnosis and follow-up of pneumoconiosis. How many hospitals have specialists who can diagnose and treat pneumoconiosis?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There is no such medical institution in the country

f. Don't know

2) I will ask about the diagnosis and follow-up of asbestosis-related diseases. How many hospitals have specialists who can diagnose and treat asbestosis-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There is no such medical institution in the country

f. Don't know

4. We would like to ask about the implementation system for examining pneumoconiosis and asbestos-related diseases.

1) How many medical institutions can perform chest X-rays (direct imaging) and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

2) How many medical institutions can perform computed tomography and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

3) How many medical institutions can perform sputum cytology examination and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

4) How many medical institutions can perform spirometry and flow volume curves examination, and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

5) How many medical institutions can perform arterial blood gas analysis and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

6) How many medical institutions can perform tuberculosis sputum smear test and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

7) How many medical institutions can perform blood sedimentation and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

8) How many medical institutions can perform tuberculin test and have physicians who can

evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

9) How many medical institutions can perform Interferon gamma release test and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

10) How many medical institutions can perform bronchoscopy and have physicians who can evaluate pneumoconiosis and asbestos-related diseases?

a. One facility in the country (e.g., located in capital city)

b. Available in major cities in the country (only in some prefectures)

c. Located in small cities in the country (all prefectures)

d. At the municipal level

e. There are no such medical institutions in the country.

f. Don't know.

今回の予備調査の結果より、インドネシア国内においては、本研究の目的を果たすために必要となる一定の人材や医療設備並びに医療機関の存在の可能性が示唆された。ただし、現地国内で具体的に本取り組みを進める際には、より詳しい情報の入手が必要と思われた。

D. 考察

研究班により作成した予備調査の質問紙（英文）を用いて行った、インドネシア国内における特殊健康診断（じん肺健康診断）の実施については、 法令では実施されていないことが確認された。一方、日本国内で行われているじん肺検診に類似した健康診断をインドネシア国内において実施すると仮定した場合、一定の制限はあるものの、インドネシア国内においての実施も可能であることが示唆された。今回の調査は、インドネシア大学の有識者に対する調査の一環として行われた。

今後、日本から帰国した労働者に対するインドネシア国内での特殊健康診断(じん肺健康診断）の実施にあたっては、対象者の把握や受診可能な医療機関の分布、特殊健康診断(じん肺検診)の結果を適切に判断できる医師の確保、それらに係る費用面での支援等の詳細についてさらに検討が必要と思われる。

該当なし

E. 結論

インドネシア国内における特殊健康診断(じん肺検診)の実施体制並びに医療機関、医療設備等の有無についての予備的な調査が行われた。

より詳細な調査が必要ではあるものの、インドネシア国内における日本からの帰国労働者に対する特殊健康診断の実施可能性が示唆された。

F. 健康危険情報

該当なし

G. 研究発表

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H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得

該当なし

2. 実用新案登録

令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

健康管理手帳制度による健康診断のベトナムでの実施のための研究

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研究要旨

【目的】

ベトナムは 100.3 百万人の人口を抱える東南アジアの国家で、移民労働者が増加している。世界 40 か国で約 65 万人が活動し、特に日本、台湾、韓国への派遣が多い。2023 年には 13 万人が海外へ移動し、そのうち 7 万人が日本に派遣された。本調査は、日本で就労するベトナム人移民労働者が、帰国後に健康管理手帳制度による健康診断を受診する余地があるかを検討することを目的とする。

【方法】

ベトナムの移民労働者管理、医療システムと品質保証システム、労働安全衛生（OSH）制度の現状について文献調査を行った。

【結果】

ベトナムの労働者管理は、労働・傷病兵・社会問題省（MOLISA）が主に担当し、移住資源センターや労働移民企業のライセンス審査を行っている。医療システムは公共部門と民間部門から構成されており、民間部門には 250 の私立病院がある。品質保証について、各病院は品質保証システムを導入する義務があり、医療従事者は 2 年ごとに継続教育を受ける必要がある。産業医専門の養成機関はなく、資格取得のためには 3 年以上の臨床経験に加え、NIOEH での 3 ヶ月間の研修コース修了ないしハノイ医科大学での 9 ヶ月間の特別指導コース修了が求められる。OSH サービスの提供システムについて、管轄部署は MOLISA と保健省（MOH）で、2015 年に OSH 法が制定された。

【考察】

ベトナムから日本への労働者派遣は歴史も古く、着実に成長している。企業の労働安全衛生の管理体制と法的枠組みは改善されており、医療制度も発展の途上にある。しかし、職業性疾患治療やリハビリテーションの支援が不十分であるため、職業性疾患に対応可能な医療機関や従事者の能力向上が急務である。

A. 研究目的

ベトナムは、面積 331,210 平方キロメートルの東南アジアのインドシナ半島に位置する国家で、100.3 百万人の人口を抱える。経済の発展に伴い、ベトナム人移民労働者も増加している。ベトナムの移民労働者は、世界 40 か国・地域で約 65 万人が活動しており、特に日本、台湾、韓国などへの派遣が多く、2023 年には約 13 万人が海外へ移動した。日本への派遣数は約 7 万人で、これまでで最も多く、累計で 50 万人以上が働いている。ベトナム政府は、労働者の技術向上や経済的な利益を追求しつつ、海外での労働を支援している。

本調査は、今後国内で増加が予想されるベトナム人移民労働者が、帰国後に健康管理手帳制度による健康診断を受診する余地があるかを検討することを目的とする。

B. 研究方法

【会議での情報収集】

ベトナム保健省保健環境管理局（Health Environment Management Agency (HEMA), Ministry of Health）を訪問し、労働安全衛生行政の実務担当者と本事業におけるベトナムでの調査実施方法について議論した。

日時：2024 年 2 月 28 日

場所：MOH's Building Office "Dan so"

会議出席者：

[Health Environment Management Agency (HEMA), Ministry of Health]

Assoc. Prof. Dr. Luong Mai Anh, Director General

Dr. Tran Anh Thanh, Leader of Occupational Health Division

Dr. To Thi Phuong Thao, Vice Leader of Occupational Health Division

Dr. Nguyen Thi Thu Huyen, Occupational Health Division

栄徳勝光　　高知大学医学部環境医学教室

Leli Hesti Indriyati　高知大学医学部環境医学教室

【文献調査での情報収集】

また、会議で得られた情報等を踏まえ、ベトナムの移民労働者管理、医療システムと品質保証システム、労働安全衛生制度の現状について文献調査を行った。

C. 研究結果

【会議での情報収集】

ベトナムにおける労働安全衛生制度の現状について、管轄部署や関連法規、労災の現状、産業医養成制度等についての情報提供を受けた。また、本事業についての説明後、健康管理手帳制度による健康診断を実施可能な医療機関の候補に関して情報提供を受けた。

【文献調査での情報収集】

移民労働者管理

労働移民に関する管轄部署は労働・傷病兵・社会問題省（MOLISA）であり、その一部門である DOLAB は労働移民の戦略や法制度について助言し、ライセンスの評価や監査を行う。また、国際移住機関（IOM）の支援により、ハノイに移住資源センター（MRC）が設立され、移民労働者の情報と支援が提供される。送出機関は、50 億ドン以上の資本を持つベトナム企業でなければならず、労働移民の経験やライセンスを取得するための要件を満たす必要がある。さらに、ベトナム人労働者の協会（VAMAS）は、送出機関の協会であり、情報伝達やトレーニング支援などの活動を行っている。

医療システムと品質保証システム

ベトナムの医療システムは公共部門と民間部門から構成されており、村や地区レベルでの一次医療から専門医による二次、三次医療まで提供される。民間部門には 250 の私立病院があり、一部の私立病院では公立医療機関から有能な医療スタッフが採用されている。品質保証システムは 2013 年に導入され、各病院は品質保証システムを導入する義務があり、医療従事者は 2 年ごとに継続教育を受ける必要がある。

産業医の資格

産業医を育成する専門の医学校は存在しない。産業医となるのに必要な要件は、①医師であること（一般、専門、または疫学のいずれか）、②少なくとも 3 年間の臨床経験を有すること、③国立労働衛生研究所（NIOEH）での 3 ヶ月間の労働疾患研修コース修了、またはハノイ医科大学予防医学・公衆衛生研究所での 9 ヶ月間の特別指導コース修了が求められる（2016 年 6 月 1 日以降有効）。

労働安全衛生制度

MOLISA、保健省（MOH）、労働組合（VGCL）、特定の産業に関わる省（農業農村開発省、運輸省、建設省など）の 4 種類の組織が OSH 行政に関係しており、特に国家レベルの管理は MOLISA と MOH が主に担当している。2015 年に労働者の安全と健康を確保することを目的として、OSH 法が制定された。法律の適用範囲には、労働契約の有無に関わらず全ての労働者が含まれ、具体的な実施ルールや国家的なプログラムが設けられている。

D. 考察

ベトナムから日本への労働者派遣の歴史は古く、現在着実に成長している。これには、適切な法整備とともに複数の利害関係者の参画を必要とする。

一方で、ベトナムは企業における労働安

全衛生の管理体制と法的枠組みの改善に向けて前進している。また、労働安全衛生制度の適用範囲を拡大しようとしている。このことは、健康診断の結果や、職業性疾患を発症する労働者数が減少傾向にあることからも示される。
現在、ベトナムの医療制度は、地方の医療機関から中央の医療機関への患者の移送システムの確立などに見られるように、発展途上にある。しかし、職業病の治療やリハビリテーションに関して支援が不十分であり、医療施設や医療従事者の能力向上が急務だ。

E. 結論

ベトナムは発展途上国で、移民労働者が増加している。企業の OSH 管理は強化されているが、医療施設や従事者の能力向上が必要である。特に職業病治療のための診断機器が不足している。本調査を通じて、ベトナムでの調査を進める上で必要となる連絡担当者を立てることができた。また、ベトナムにおける OSH サービスの提供システム及び品質保証システムについての文献調査を終えることができた。一方で、ベトナムの健康診断実施病院リストの収集、病院調査の実施は次年度以降の課題となった。

F. 健康危険情報

該当なし

G. 研究発表

1. 論文発表

該当なし

2. 学会発表

［International meeting］

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Assessment of Chest Ray Profile in Relation to Prevalence of Silicosis aming Tuberculosis Patients in West Java, Indonesia,34th International Congress on Occupational Health (ICOH), Marrakesh, Morocco, April 2024

［National meeting］

1. Indriyati LH, Eitoku M, Naw Awn J-P, Nishimori M, Hamada N, Sawitri N, Suganuma N
Prevalence of Radiographic Silicosis among Tuberculosis patients in West Java, Indonesia: Preliminary report from Hospital Based Study . The 67th Chugoku-Shikoku Joint Conference on Occupational Health 第 67 回中国四国合同産業衛生学会本, Ehime, December 2023

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97th Annual Meeting of Japan Society for Occupational Health, 第 97 回日本産業衛生学会, Hiroshima, May 2024

H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得
該当なし
2. 実用新案登録
該当なし

VIETNAM REPORT

1. General Information

1.1. Vietnam Geographic

Vietnam is a tropical Southeast Asian surrounded by China, Laos, and Cambodia, located on the eastern edge of the Indochina Peninsula. Its entire area is 331 210 square kilometres on land. On April 25, 1976, the Democratic Republic of Vietnam changed its name to the Socialist Republic of Vietnam[1].

Fig 1. The Map of Vietnam

The country is divided into six geographic socioeconomic regions: Northern midlands and mountain areas, Red River Delta, North Central area and Central coastal area, Central highlands, Southeast and Mekong River Delta. Hanoi is the capital of Viet Nam, located in the Red River Delta. Ho Chi Minh City (formerly Saigon) is the largest city located between the Southeast and Mekong Delta regions. The nation is divided into 63 provinces and cities. Each province and city are organized into districts, towns, and cities (at the district level). Districts are organized into communes, wards, and townships (commune level)[2].

1.2. Vietnam Population

Vietnam is undergoing rapid demographic and economic development. Vietnam now has a population of 97.3 million, which is predicted to reach 100 million by the end of 2024. Vietnam's population is expected to reach its peak of 109.78 million in 2054. Vietnam's population grows by roughly 1% every year, adding approximately 1 million people each year. Vietnam, located on the eastern tip of the Indochina peninsula in Southeast Asia, is one of the region's largest and most densely inhabited countries. The population sex ratio was 99.5 males per100 females in 2022. With more than fifty different ethnic groups, Vietnam is a multiethnic nation.[3]

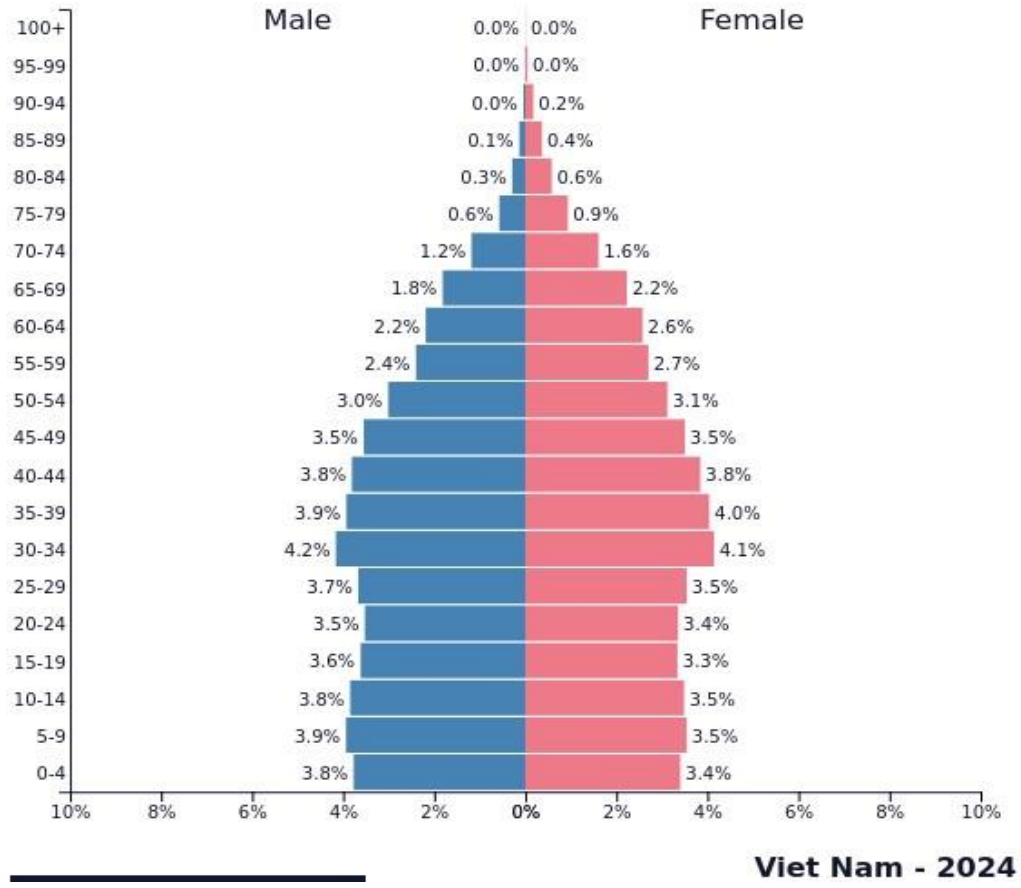

Fig 2. The Pyramid of Vietnam's Population

1.3. Vietnam Labor

1.3.1. General

The number of people in the labor force who are 15 years of age or older reached 51.7 million in 2022, up 1,144.4 thousand from the previous year; the number of people in the labor force who are 15 years of age or older and work in economic sectors was 50.6 million, up 1,532.7 thousand persons. There were over 51.3 million employed individuals in Vietnam in 2023. The nation's labor force participation rate was 68.9 % in that year. The agriculture, forestry, and fisheries industry in Vietnam employed almost 14 million people in 2022, making it the industry with the highest number of employees overall. In contrast, the manufacturing sector employed almost 11.8 million people in that year, making it the second most employed sector in the country. In total, 50.6 million people were employed in Vietnam in that particular year. In 2022, there were 148.5 thousand newly registered businesses nationwide, with a total registered capital of 1,590.9 trillion VND and 981.3 thousand registered employees.[4]

1.3.2. Social Insurance

The percentage of workers who have reached retirement age is still low compared to the potential of the labor force, which puts a lot of strain on security assurance. With 5.18 percentage points more than in 2016 and 9.78 percentage points more than in 2011, the SI participation rate only made-up 32.55 percent of the working-age population in 2020. Consequently, around 68% of the labor force of working age did not have access to SI in 2020. Since 2018, a policy has been in place to encourage workers in the informal sector to participate in SI, which has improved the coverage of voluntary SI.[5]

1.3.2. Unemployment Insurance

Between 2011 and 2019, the number of people covered by UI increased by an average of 6.64 percent year. This resulted in a rise from 7.97 million (17.78 percent of the working-age labor force) in 2011 to 13.43 million (27.2 percent) in 2019. But in 2020, as a result of the COVID-19 pandemic's effects, this rate marginally dropped to 13.3 million persons (26.82 percent).

1.3.3. Organization

The Vietnam General Confederation of Labour (VGCL), tasked with representing workers' interests, is Vietnam's sole and unified trade union organization, consisting of the 18 National Industrial Unions and Labor Federations in all 63 cities and provinces under the Central Government. VGCL currently has over 6 million members. Mr. Dang Ngoc Tung is the President of VGCL.[6]

1.4. Migrant Worker

According to the report of the Ministry of Labor, Invalids and Social Affairs (MOLISA), currently, around 650,000 Vietnamese labourers are working in 40 nations and territories around the world. There are more than 500 businesses licensed to send Vietnamese workers abroad.

Migration from Vietnam has entirely recovered from the COVID-related decline. In the first ten months of 2023 (January-October), 132,645 people (44,669 women and 87,976 men) moved for employment overseas, exceeding the Vietnamese government's target of 110,000 external migrants for the year. 67,550 people left for Japan, 50,862 for Taiwan, 5,973 for the Republic of Korea, and 1,669 for the People's Republic of China, among other destinations. Currently, Viet Nam ranks first among 15 countries sending workers to Japan. This year has witnessed the biggest number of Vietnamese workers heading to Japan, with over 85,000 workers going each year and over 300,000 presently working in Japan. Apart from traditional markets such as Japan, Taiwan, and South Korea, the ministry has also moved to explore new markets for Vietnamese workers, especially in Europe, such as Hungary, Poland, Slovakia, and Croatia [7]

1.4.1. History

Under an agreement called the Program on Sending and Receiving Foreign Internship in Japan between the Vietnam Ministry of Labor, Invalids and Social Affairs (MOLISA) and the Japan International Training Cooperation Organization (JITCO), Japan has been accepting Vietnamese workers since 1992, mostly through the Japanese Industrial Training Program (ITP) and the Technical Internship Program (TIP). Between 1992 and 2010, there were only approximately 52,000 Vietnamese workers transported to Japan, but the annual intake has risen to 5,000 or more in recent years. The number of Vietnamese trainees in the 1990s was fewer than Chinese, Indonesian, Philippine, and Thai trainees. To be selected as a trainee in Japan, workers must normally achieve rather high technical qualifications. According to MOLISA figures, up to 80% of workers transported to Japan between 1996 and 2006 had high-level technical capabilities. However, "high-level technical skills (lanh nghe, trinh do cao)" is not clearly defined (Luu Van Hung [2011, 141]).[8]

In 2012, Vietnam began sending nurses to work in Japan as part of the Vietnam-Japan Economic Partnership Agreement (VJEPA). Since these agreements, there have been a consistent rise in the number of Vietnamese employed in Japan, especially in the previous five years. The number of workers moving to Japan surged by 30% between 2017 and 2018. Vietnam sent nearly twice as many workers to Japan as the Philippines (164,000 workers), and it became the second-largest source country (317,00 workers) after China (389,000 workers) (Phuong, 2019). Vietnamese immigrants view employment in Japan as a means of developing their technical job skills in addition to a means of making money.

1.4.2. Labor export policy and legislation

Labor export has been a key socioeconomic development policy of the Party and administration in doi moi-era Vietnam. The corresponding legal framework for labor export has been designed. By 2003, Decree 370 has been renewed three times (Decree 07 in 1995, Decree 152 in 1999, and Decree 81 in 2003). The National Assembly also passed the Law on Vietnamese migrant workers in 2006. The Law consists of 80 articles divided into eight chapters. Compared to the previous Decree 81, which had 37 articles in seven chapters, a new chapter on "Teaching of Jobs and Foreign Languages and Provision of Necessary Knowledge" (Chapter IV) was added, and provisions on the organization and activities of enterprises sending migrant workers abroad (hereinafter, sending agencies), contracts and related fees, guarantees for migrant *workers, and* policies regarding workers after they returned home were expanded or newly added. Overall, if effectively implemented, the new Law is projected to contribute to better protecting the rights of Vietnamese migrant workers.

The new program, which went into effect on November 1, 2017, saw the sending countries' governments and the Japanese government signing a Memorandum of Cooperation with the purpose of removing improper sending organizations. Accredited sending organizations were added to the Organization for Technical Intern Training website in April 2018 as part of a Memorandum of Cooperation. Beginning September 1, 2018, technical intern trainees from non-accredited sending organizations will no longer be accepted under the Memorandum of Cooperation.

Article 17 of the 2013 Constitution stipulates: "Vietnamese citizens abroad are protected by the State of the Socialist Republic of Viet Nam". With regards to Vietnamese workers abroad, Clause 1, Article 150 of the Labour Code 2019 regulates that: “The State encourages enterprises, agencies, organizations, and individuals to seek and expand the labour market for Vietnamese workers to work overseas. Vietnamese workers working abroad must comply with the laws of Viet Nam and the laws of the destination country unless otherwise provided for by an international treaty of which the Socialist Republic of Viet Nam is a member.”[9]

In order to protect Vietnamese citizens abroad, especially Vietnamese workers working abroad, the State of Viet Nam has promulgated a system of legal documents regulating social relations related to the migration of Vietnamese workers abroad. Such legal documents include:
• Law on contract-based Vietnamese workers overseas, promulgated on 13 November, 2020. This Law consists of eight chapters and 74 articles that stipulate rights, obligations and responsibilities of contract-based Vietnamese workers abroad, enterprises, non-business units and agencies, organizations and individuals related to the field of contract-based Vietnamese workers abroad; vocational skills training, foreign languages, and orientation training for the workers; the Fund for Overseas Employment Support; policies for the workers; and state management in the field of contract-based Vietnamese workers abroad. • Decree 38/2020 ND-CP dated 03 April 2020 detailing the implementation of a number of articles of the Law on Contract-based Vietnamese Workers Abroad.

1.4.3. Key stakeholders in labor migration

1.4.3.1. The Department of Overseas Labor (DOLAB) and other institutionsunder MOLISA

MOLISA is in charge of the state management of labor export. As part of MOLISA, DOLAB—which took over from DILACO in the 1980s—advises the Ministry on labor export strategies, plans, and legislation in addition to conducting assessments for the purpose of granting or rescinding labor export licenses, auditing and inspecting labor export activities, and handling violations of related provisions.

As a pilot project funded by the International Organization for Migration (IOM), DOLAB established the Migration Resource Center (MRC) in Hanoi in 2012. The MRC offers reliable information and assistance to Vietnamese migrant laborers who are considering or have returned home. Additionally, MOLISA is the manager of two state-owned businesses (SOEs) that are authorized to engage in labor export. In addition, TRIANGLE in ASEAN delivers assistance directly to migrant workers and their communities through a network of Migrant Worker Resource Centres (MRCs). These MRCs are managed in partnership with government institutions, trade unions and civil society organizations, and provide a range of services in countries of origin and destination. [10]

1.4.3.2. Sending agencies

A sending agency must be a 100% Vietnamese firm with legal capital of at least 5 billion dong (about US$250,000), per the present requirements. Prior to the Law on Vietnamese Migrant Workers and the Implementation Decree, only state-owned businesses or specific mass groups may provide labor export services. However, domestic private companies are now eligible.

An organization must have a labor export or international cooperation program, a specialized section that offers pre-departure training to workers, an administrative leader with a university degree or higher, at least three years of experience in labor export, and a deposit of one billion dong (roughly US$50,000) in order to be granted a license. If a licensed sending agency violates any of these requirements, does not send workers overseas within a year of receiving a license, or does any of the prohibited acts specified in the law (e.g., sending workers to dangerous areas or forcing them to engage in hazardous activities), their license may be revoked. There are 439 approved Vietnamese sending organizations listed on the JITCO website[11]. A large number of the sending agencies are small-scale businesses.

1.4.3.3. Branches of sending agencies, brokers, and local governments

The Law on Migrant Workers from Vietnam states that sending agencies are required to hire employees directly, without charging for the service. Sending agencies may allocate up to three branches in three provinces as part of their labor export services in order to facilitate services. More precisely, branches are prohibited from signing contracts for labor supply or migratory workers, as well as from collecting deposits and service or brokerage fees5 from employees without the enterprise's consent. In reality, though, the process of hiring foreign laborers is typically very intricate and multi-layered, involving a number of different entities and people.

Sending agencies may have up to three branches, but they also establish "centers." Some sending agencies do not even look for overseas partners, review labor supply contracts, or recruit workers themselves, instead allowing their branches and centers to handle all substantive work with little supervision. Brokers are also quite involved. According to the Supervisory Report of the National Assembly Standing Committee, in several of the communes visited by the Supervision Mission, 70-80% of the workers were recruited through brokers rather than directly by sending agencies.

According to the Law on Vietnamese Migrant Workers, sending agencies must notify the provincial Departments of Labor, Invalids, and Social Affairs (DOLISAs) when recruiting workers in their respective localities, as well as regularly report recruitment results and the number of workers sent abroad. In reality, municipal governments are frequently more intimately involved in the recruitment process. Local governments, particularly district authorities and employment introduction centers, are frequently tasked by sending agencies to collect and screen applications. Once a specified number of workers have been registered, the sending agency dispatches its personnel to make the final decision.

1.4.3.4. Vietnam Association of Manpower Supply (VAMAS)

The Minister of Internal Affairs formed VAMAS, an association of sending agencies, in 2003. Although participation is voluntary, VAMAS has 136 members, including all important players. The current chairman of VAMAS is a former vice minister of MOLISA. According to the association's statute, the purpose of VAMAS is to coordinate and liaise between sending agencies and concerned offices, organizations, and individuals, as well as to assist member enterprises in improving knowledge, conducting research, proposing solutions to labor export problems, and effectively assisting one another, so that all members can develop equally and their rights and interests are protected.VAMAS activities include fostering information transmission and exchange through newsletters, assisting member firms with employee training, and consulting on labor-export conflicts[13].

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VAMAS activities include fostering information transmission and exchange t hrough newsletters, assisting member firms with employee training, and consulting o n labor-export conflicts. In 2010, VAMAS collaborated with the ILO to develop a Code of Conduct (CoC) for sending agencies based on Vietnamese laws and international labour standards. In addition, a methodology for assessing sending agencies' compliance with the CoC was established in 2012. The review is based on data gathered from a variety of sources, including the media, workers and their families, other sending agencies, local governments, and concerned organizations in receiving countries.

2. Healthcare System

2.1. Healthcare Setting

2.1.1 Public Sector

Vietnam's present healthcare system is a combination of public and private elements. Ensuring that the entire population has access to preventive and curative care is a critical responsibility of the public system. After the nation was reunited, the Vietnamese government worked to enhance public health. In addition, the government launched health education initiatives and developed national health insurance. The administrative structure for healthcare facilities in Vietnam is outlined in Article 81 of Chapter VIII of the 2009 Law on Examination and Treatment, which governs the organization of medical examination and treatment facilities. There are four levels of administrative hierarchy which are **commune, district, provincial, and central.**[14]

Administrative tier	Level	Coverage
Central	I	National
Provincial	II	1–2 million people
District	III	100 000 to 200 000 people
Commune	IV	5 000 to 10 000 people

Table 1. Administrative structure for healthcare in Vietnam

Primary healthcare services are provided at the commune and district levels. Primary care is the cornerstone of the Vietnamese national health program and the framework upon which the health system is built. Secondary and tertiary care is provided by specialized medical personnel at the provincial and central levels. Vietnam's Ministry of Health is the top central government institution tasked with safeguarding the public's health, including the issuance of laws and other legal instruments pertaining to health treatment, health prevention, and health protection.

Health policymaking is often top-down, with central decisions and systemic implementation. The process begins with the MOH establishing and developing a policy agenda based on evidence, with collaboration from all relevant MOH. Proposed policies will need approval from the National Assembly's Government or Social Affairs Committee. The MOH and local authorities will execute and monitor approved policies, with oversight from appropriate MOH departments, research institutions, and the National Assembly's Social Affairs Committee.[15]

DOHA, or Direction of Healthcare Activities (Chỉ đạo tuyến in Vietnamese), is the English translation of the Ministry of Health advice on healthcare provision and the relationship between upper and lower-level hospitals. DOHA is altered and adjusted depending on the demand for medical care, but it remains an important phrase in the context of medical care reform. It monitors a variety of public health indicators to meet goals for improving health standards.

2.1.2. Private Sector

In 2020, Vietnam Investment Review reported that there were 250 privately owned hospitals, and the number of such hospitals was increasing. This accounts for 5.6% of the total number of hospital beds and 17% of the total number of hospitals in Vietnam, which is 1,400. Based on a report from 2017, private hospitals play a crucial role in the healthcare system of the country by offering over 60% of outpatient services. While a few private hospitals boast considerable resources and a highly competent medical workforce recruited from the public health sector, the majority of private hospitals have less than 100 beds. According to the Medical Practitioner Society of Ho Chi Minh City, a significant proportion of private medical practitioners, up to 70%, also have positions in the public sector.

2.2 Health Facilities

The Ministry of Health is in charge of provincial, district, and commune health facilities and is in charge of developing and implementing health care services at the appropriate level.Numerous health facilities are under the management of the Ministry of Health, including research and Pasteur institutes, universities, colleges, and national hospitals.

Every province has a minimum of one provincial hospital, which serves as a support system for national hospitals throughout all stages of care. Basic care, emergency services, and

common disease treatment are provided at the district level. Lastly, basic care, health education, and awareness programs are provided at the community level.

Figure 3: Organisational chart of Vietnam's healthcare system, illustrating roles and responsibilities of each component (adapted from the Ministry of Health)[57]

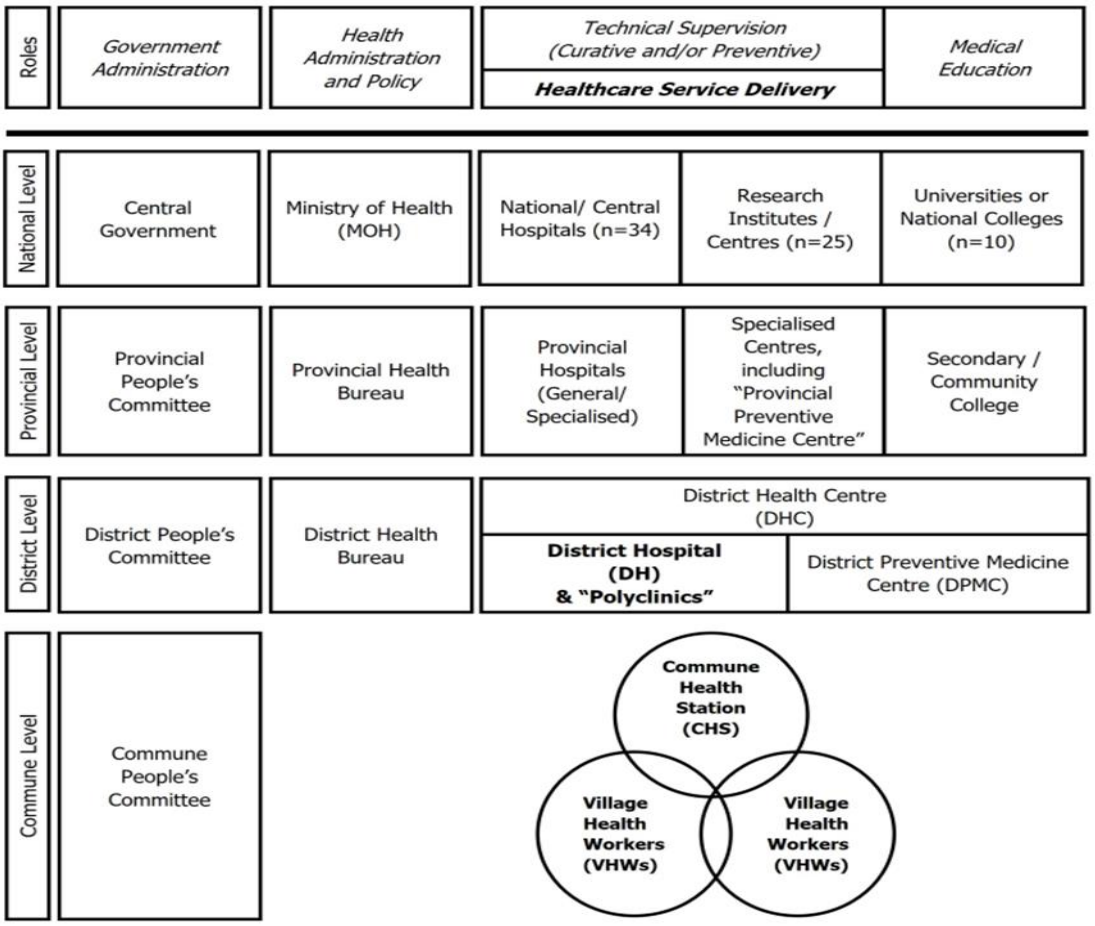

Fig 3. Organisational chart of Vietnam;s healthcare system, illustrating roles and responsibilities of each component

According to the Health Statistical Yearbook 2018, there are 47 central health facilities with 31,436 beds. These institutions consist of 20 general hospitals, 20 specialist hospitals, three traditional medicine hospitals, three leprosariums, and one dermatology hospital.

The research institutes include the Health Strategy and Policy Institute, Institute of Hygiene and Epidemiology, National Institute of Nutrition, National Institute of Occupational and Environmental Health, and Pasteur Institutes in Ho Chi Minh City and Nha Trang. Research institutes offer postgraduate education and prevention services. Health professional education institutions offer training programs at medical and pharmaceutical universities, as well as medical colleges. The Ministry of Health directly manages most of these institutes. Medical universities typically have training hospitals with approximately 200 beds to support training, research, and healthcare.

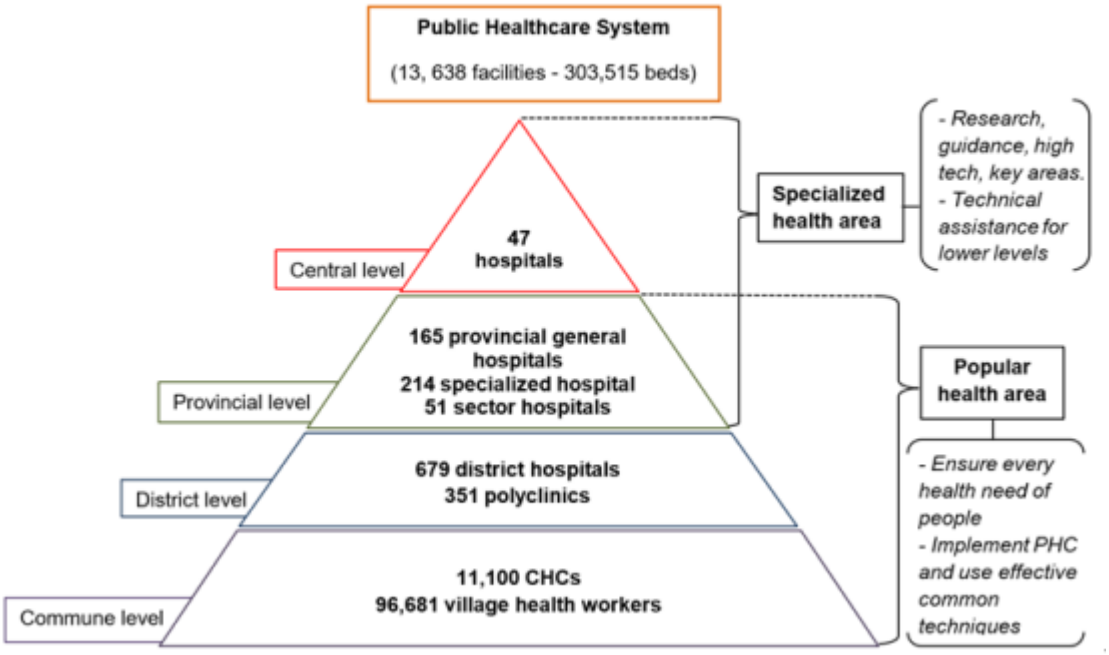

Fig 4. Public Healtchare System in Vietnam

Provincial health institutions include state-level departments of health, as well as medical services including general and specialty hospitals. Provincial hospitals usually have around 500 beds. The specialist hospitals include maternity, obstetric, and pediatric, traditional medicine, and tuberculosis and lung disease hospitals. Provinces also have specialized medical centers overseen by the Department of Health in reproductive health, preventive medicine, HIV/AIDS prevention, forensics, eye disease, communication and health education, and food safety and population.

Each province often has a medical college or secondary medical school that provides programs in medicine, nursing, midwifery, medical technology, and pharmacy based on the province's needs. Both the provincial and district hospitals are under the supervision of the MOH.Additionally, a number of industries have their own hospital and clinic networks run by government organizations such the Ministries of Transportation, Ministry of Construction,etc. The military health system is organized separately.

Types of health facilities	Number of facilities	Number of beds
Public health facilities		
Central level	46	26 756
General hospitals	17	13 750
Specialist hospitals	23	11 260
Traditional medicine hospitals	3	1040
Dermatological and venereological hospitals	3	706
Local levels	12 694	236 383
Provincial level	447	110 549
General hospitals	140	66 450
Specialist hospitals	153	30 652
Traditional medicine hospitals	52	7220
Dermatological and venereological hospitals	17	1445
Sanatoriums and rehabilitation centres	37	3745
Specialist clinics	48	1037
District level	1214	77 134
General hospitals	628	70 547
Intercommune polyclinics	574	6371
Maternity homes	12	216
Commune level	11 033	48 700
Commune health stations	11 033	48 700
Facilities managed by other ministries	785	12 925
General hospitals	26	5035
Polyclinics	17	695
Sanatoriums	26	3790
Health centre	6	3405
Health station	710	
Private hospitals	155	9501
Total	13 680	285 565

Table 2. The number of health facilities and beds and levels

Hanoi and Ho Chi Minh City are home to the majority of the country's general and specialty hospitals. These are the provincial hospitals in each region with the highest referral rates.

Top 5 Central Hospitals:

Hospital name	Type of hospital	Number of beds
Bach Mai Hospital	General	1,900 beds
Cho Ray Hospital	General	1,800 beds
K Hospital	Oncology	1,800 beds
Huu Nghi Viet Duc Hospital	General	1,200 beds
University Medical Center Ho Chi Minh City	General	1,000 beds

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Table 3. The List of Central Hospitals

2.3. Health Finance

The health system is funded primarily by the Government. Vietnam's social health insurance system, founded in 1992, is the primary public funding source for healthcare. The MOH states that in 2020, approximately 91 % of the population had health insurance. Health insurance is essentially a part of social insurance. There are two types of health insurance:
•Compulsory
• Voluntary.

A voluntary scheme was started for those not eligible for the compulsory scheme. Social health insurance is managed by the Vietnam Social Insurance, a single fund that is directly under the Government and 63 social agencies in provinces. The website Pháp Luật Doanh Nghiệp (Corporate Law) explains that employers are required to contribute to the social health insurance scheme. The premium is quoted as being 4.5 % of the employee's monthly salary. Employees are required to contribute 1.5 % of their salary.

Decree No. 85/2012/ND-CP states that by 2018, health care services will have a price that includes all seven cost components. The MoH collaborated extensively with the Vietnam Social Security (VSS) and other relevant ministries/sectors to draft and complete HI laws and policies, most notably the National Assembly-passed Revised Health Insurance Law 2014, which went into effect on January 1, 2015. There has been an increase in HI coverage from 60.9% in 2010 to 76.52% in 2015.

VSS reimburses hospitals for curative care. The health financing system is different at district level. The VSS pays district hospitals annually for outpatient services, hospital stays, and referrals to provincial hospitals for each insured person. This is referred to as 'capitation-based' payments. They place district hospitals at significant financial risk if they exceed their annual budget, with little control over their financial plan and expenditures. District hospitals are also liable for treatment costs incurred by insured patients at Commune Health Centres under their jurisdiction. Finally, the Commune Health Centres have a distinct funding mechanism: the two primary sources of revenue for these centres are budget from the province which primarily covers staff salaries and other operating expenses such as electricity, and health insurance payments for curative care services. However, there are no clear criteria to determine how much the Commune Health Centres should be reimbursed for curative services.

2.4. Health Information Technology

Vietnam's health information system is improving; however, many medical facilities still use paper records for patients and diseases. Vietnam has set an objective to promote Electronic Health Records (EHRs) since June 2018. The government's EHR implementation strategy (Decision No. 5349/QD-BYT) requires at least 80% EHRs will soon be available in provinces and central cities, with the aim of reaching 95% of the national population by 2025.

2.5 Health Quality Control

2.5.1. Hospital quality management.

In 2013, the hospital constructed a quality management system and developed assessment standards. The circular mandated that all hospitals establish a quality management system, which would include a committee, office, or unit dedicated to quality management, as well as a network of quality management. The provincial health bureaus are in charge of overseeing quality control for the medical facilities situated within the province. A pilot program for a set of metrics for hospital quality assessment was launched in 2013. This set of metrics was grouped into 5 groups in 2014, and each group consisted of 5 performance levels for the 83 criteria. Hospitals are required to implement 1487 subcategories of quality standards in total. Approximately 1233 hospitals across the country used these standards in 2014, and the quality of their services improved in comparison to 2013. Four hospitals in Vietnam have obtained JCI certification, including 3 hospitals located in Ho Chi Minh City: Cao Thang Eye Hospital, French-Vietnamese Hospital - FV Hospital, Vinmec International Hospital - Central Park; and Vinmec International Hospital - Times City in Hanoi [15].

After two years, 55.4% of hospitals nationwide have established quality management departments. The test quality control system includes three test centers and about 1,400 laboratories. Medical examination methods have been simplified from 12-14 steps to 4-7 steps for each condition, resulting in an average examination time of 48.5 minutes (approximately 50%) compared to the pre-intervention period. Standard competencies for medical practice have been developed and applied to nurses, midwives, and general practitioners. Approximately 4,000 clinical guidelines have been developed. Disparities in health service quality and indicators persist among areas. Overcrowding in Central hospitals and big cities has been addressed to some extent, but more has to be done in the future. The quality management system is limited due to the lack of an independent rating agency and the absence of quality management departments in approximately 44% of hospitals. The clinical audit process has not been implemented, and resistance to accept test results across health facilities is nevertheless prevalent.

Every year, under their direction, the MOH and the Provincial Department of Health create and carry out a strategy for monitoring and assessing hospital quality. For instance, the Ministry of Health published Decision No. 6328 / QD-BYT on October 18, 2018, which outlined the contents of hospital quality inspection and assessment as well as a survey of medical staff and patient satisfaction in 2018.

2.5.2. Certification of Health Practitioner

There are five levels of health professions education in Viet Nam: secondary, college, university, residency, first level specialist (CK1), second level specialist (CKII) and Doctor of Philosophy (PhD). The Ministry of Health oversees postgraduate specialist training programs, including level 1 and 2 training and residence (Government). 2011a). The Ministry of Health oversees and supervises. Continuing medical education (CME) and practical training for new graduates and health system professionals before providing licenses.

Health professionals are required to hold a license in order to practice medicine under the Law on Examination and Treatment (LET). Every two years, health workers need to complete at least 48 hours of continuing education in order to keep their licenses valid. CME for health professionals is managed centrally by the Ministry of Health. Hospitals, medical schools, and nursing homes are among the public training facilities that offer the majority of CME courses. Nevertheless, the majority CME programs are implemented at the central and provincial levels, and commune health professionals may not have the opportunity to participate because several healthcare facilities lack a health workforce. When a health professional's license is revoked for not meeting the CME requirement, they have to reapply for a new license, which involves submitting extra paperwork to the licensing body along with their CME certificate.

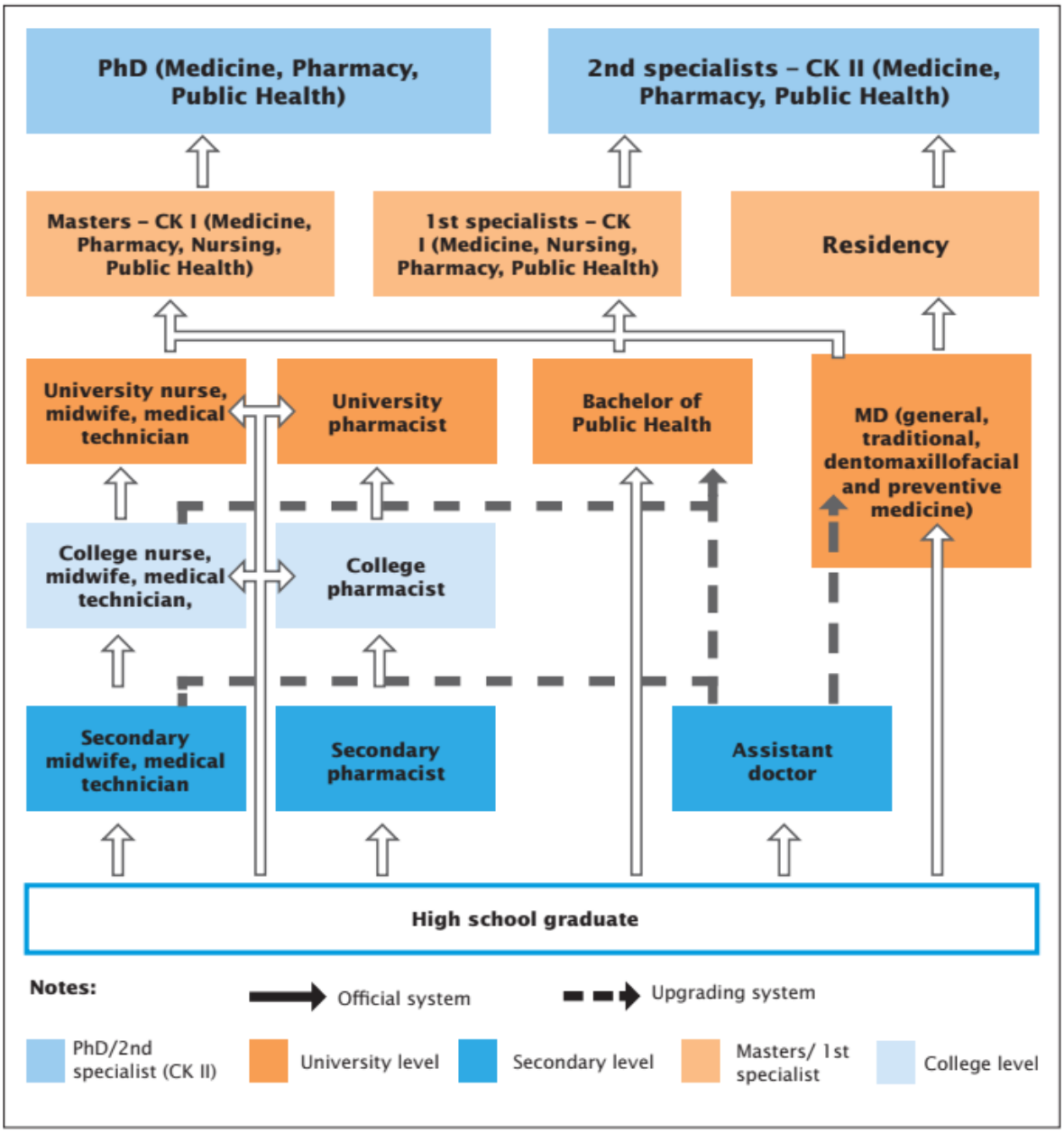

Figure 5. Health professions education system in Vietnam

2.5.3. Accreditation mechanism applied in competency-based training.

In Vietnam, doctors, nurses, and midwives are not regulated by national examinations. Both standardized exit exams and standardized examinations during degree programs are absent. Beginning in 2011, the Law on Medical Examination and Treatment mandated that medical practitioners obtain a license and regularly update their knowledge. In accordance with the Law on Medical Examination and Treatment (2009), Decree No. 87/2011/ND-CP, Circular No. 41/2011/TT-BYT, and Circular No. 03/2013/TT-BTC, the health sector continues to grant medical practice certificates and operating licenses. There is currently no nationwide implementation of the database system for the registration a nd administration of operating licenses and medical practice certificates.

In 2015, 95% of health facilities and 92% of staff in MoH hospitals, 25% and 67% in other ministries and agencies, and 65% and 89% in hospitals under provincial Departments of Health (DoH) were licensed. Competency standards for healthcare staff, such as nurses (2012), midwives (2014), and general practitioners (2015), have been issued [16].

2.5.4. Certification for Occupational Health Practitioners

There are no medical schools that specialize on occupational health. To become an occupational health physician or doctor, you must meet the following conditions:

- ✓ Must be a medical doctor (general, specialty, or epidemiology)
- ✓ At least 3 years of clinical experience
- ✓ Complete a 3-month certificate training course on occupational disease at National Institute of Occupational Health (NIOEH) or a 9-month special orientation at Hanoi Medical University's Institute of Preventive Medicine and Public Health (effective as of June 1, 2016)

Prior to June 1, 2016, medical doctors that dealt with the diagnosis and detection of OD only attended one-week to three-month-long short courses hosted by preventive medicine institutions including the Ho Chi Minh Institute of Public Health and NIOEH. According to the training's data, 69 courses on occupational disease were held for 1,689 MDs working in the OH area between 2010 and 2015 as part of the National program on OD prevention 2010–2015 and the ADB project on strengthening capacities in OD detection and diagnosis for OD physicians/doctors at provincial and district levels. These activities were also coordinated by NIOEH and the Ho Chi Minh Institute of Public Health.

NIOEH and the National Institute of Epidemiology and Hygiene (before to 2015), also Army Academics (prior to 2015) offer PhD training in occupational health. However, the 9-month course will no longer be available after 2020. Subjects for PhD training include general and specialized MDs, with the exception of MD specialized in preventive medicine, MSc. in preventive medicine, and Specialized MD degrees I and II.

2.5.5. Medical equipment and infrastructure quality management

The inspection of investment activities and the use of equipment in health facilities has been intensified. The Ministry of Health collaborates with the Ministry of Science and Technology, the Medical Equipment Association of Vietnam, and specialists to encourage research, suggest priority subjects, and manufacture medical equipment.

There are certain pieces of equipment that are limited to a few district hospitals. Table below shows the specific equipment that is available at district hospitals in survey in 2015. In Dak Lak and Dien Bien, the percentage of hospitals equipped with HbA1C testing equipment was relatively low. In contrast to Dien Bien, where there were none, over half of the hospitals in Hanoi and Dong Nai possessed CT scanners [16].

	Basic equipment	Resuscitation & Emergency care				Diagnostic		Labor atory testing
	Infant scale (100g)	Child ventilator	Infant incubator	Anesthesia machine	Defibrillator and pacemaker	CT scanner	Electrocar-diogram	Hb1AC testing device
Dien Bien	90%	30%	60%	80%	90%	0%	30%	20%
Dak Lak	90%	70%	100%	100%	90%	20%	50%	20%
Binh Dinh	82%	27%	82%	100%	55%	27%	73%	27%
Dong Thap	100%	27%	46%	73%	91%	18%	73%	55%
Dong Nai	100%	44%	67%	78%	89%	44%	78%	89%
Rural Hanoi	100%	78%	100%	94%	89%	11%	72%	50%
Urban Hanoi	33%	33%	33%	50%	44%	56%	89%	50%
Total	87%	47%	73%	84%	80%	23%	67%	44%

Table 4. The Medical Equipment in Some District Hospitals

There is still a significant absence of reciprocal acknowledgment of laboratory test results among healthcare providers. Clinical laboratory testing and diagnostic imaging services see an annual growth rate of about 10%. On October 14, 2015, the Ministry of Health issued Decision 4276 / QD-BYT to significantly improve the quality management capabilities of medical examination and treatment facilities. This Circular recognizes worldwide and foreign standards for monitoring the quality of medical examination and treatment in Vietnam.

The health sector aims to improve medical equipment storage and maintenance, with a focus on training technologists. The Ministry of Health has partnered with Hanoi Polytechnic University to train bio-medical electronic engineers. They have also invested in and upgraded Medical Equipment and Technique College, including a new branch in Hanoi and Hai Duong. Currently, 62% of province general hospitals, 26.1% of provincial specialty hospitals, and 31.9% of district general hospitals have medical equipment maintenance teams. The MoH collaborated with allied sectors to create and release 135 sectoral and 35 national standards for medical equipment. The capacity of the network for medical equipment calibration and quality control has been strengthened.

3. NIOSH Profile

3.1. Authority or Body, Responsible for OSH

In Vietnam, basically, four types of organisations are related to the OSH administration: the Ministry of Labour, Invalids and Social Affairs (MOLISA), the Ministry of Health (MOH), the Trade Union (Vietnam General Confederation of Labour: VGCL), and Ministries of particular industries (Ministry of Agriculture and Rural Development, Ministry of Transportation, Ministry of Construction, etc) [17].

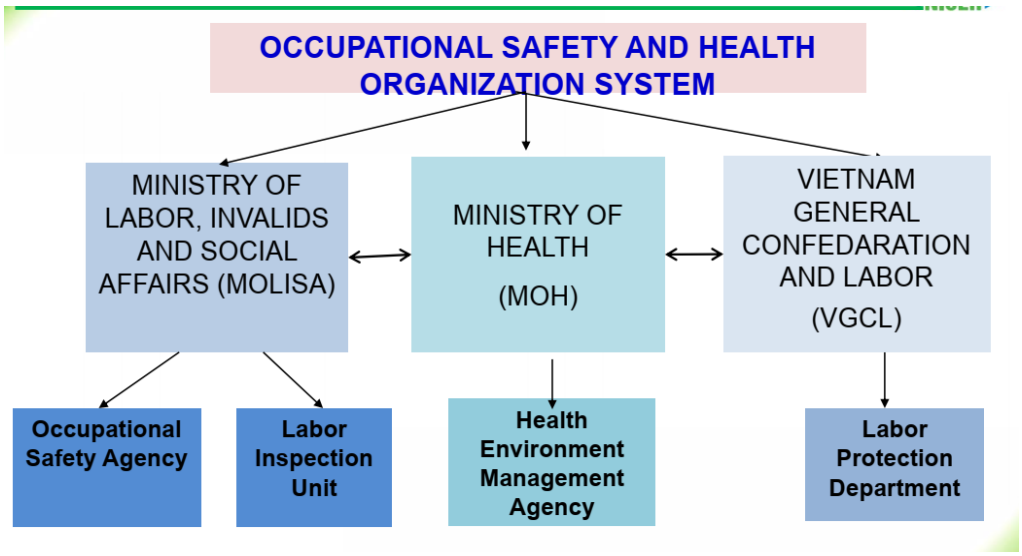

Fig 6. Occupational Safety and Health Organization in Vietnam

MOLISA and MOH are principally responsible for the state management of Occupational Safety and Health (OSH). MOLISA is accountable for ensuring work safety, whereas MOH is accountable for the provision, safeguarding, and advancement of workers' health. The Council for occupational safety and health is structured into three tiers: National, provincial, and grassroots levels[18].

Decision No. 1278/QD-BYT dated April 20, 2010, of the Ministry of Health stipulating functions, tasks, power and organizational Structure of The Health Environment Management Agency (HEMA) of the ministry of health. This organization is commissioned to advise to the Minister of Health, to implement functions of the Ministry related to health environment, including: protection of environment of medical establishments, protection of environment in burial activities, environmental health; hygiene and occupational health, occupational diseases prevention and accident & injury prevention, control of health impact due to climate change; management of chemicals, disinfectants, insecticide products for domestic and medical use and other tasks related to health environment according to Law. HEMA is a legal body, has its own seal, account, and office in Hanoi.

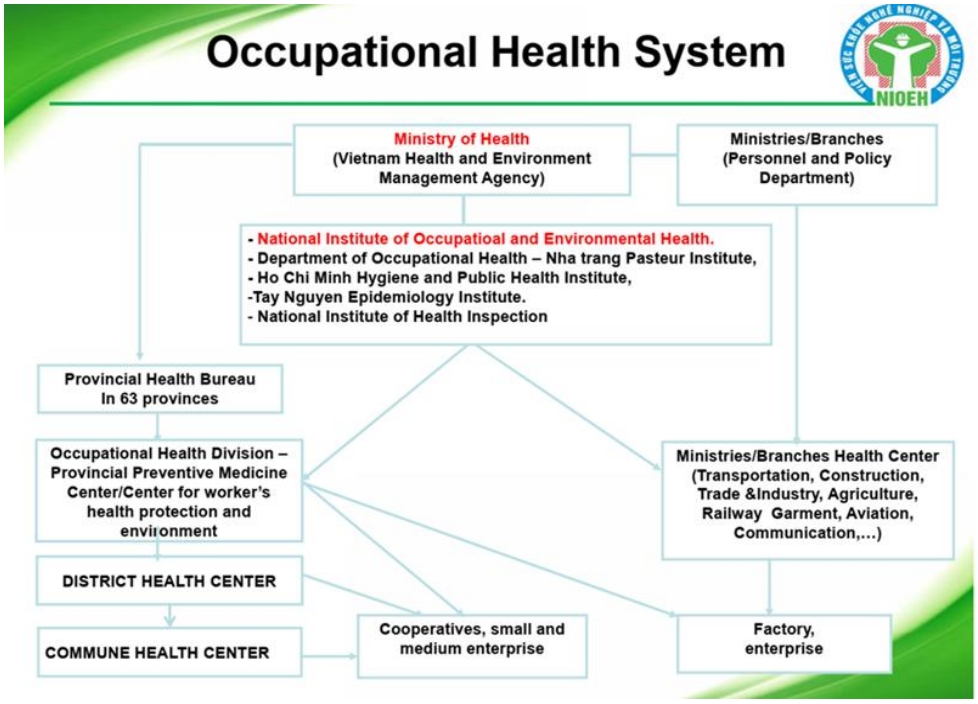

Fig 7. Occupational Health Organization Under the Ministry of Health

Another organization of the MOH is the National Institute of Occupational and Environmental Health (NIOEH). The National Institute for Occupational Safety and Health (NIOEH) is responsible for the coordination of occupational and environmental health activities in Vietnam. This includes scientific and technological services, international cooperation, and research pertaining to occupational health (including ergonomics, labor psychophysiology, occupational health, and labor sanitation and safety), the prevention of accidents and injuries, sanitation, and environmental health.

In addition to performing examinations and monitoring, the 63 province-based Preventive Medicine Centers (PMCs) received professional development and informational consultations, and occupational and environmental health regulations were revised. Occupational health at the provincial level falls under the competence of the PMC. Aside from the PMCs, the province also houses medical centers (MCs) that cater to other important ministries such as Industry, Construction, Transportation, and Mines and Coal. These MCs have the responsibility for overseeing all occupational and environmental health initiatives at factories, enterprises, and companies held by the Ministries. (Vietnam silica exposed)[19]

The Ministry of Labour, Invalids and Social Affairs (MOLISA)_ is responsible for employment and labour matters. This ministry, in particular, the Bureau of Safework, is responsible for the administration of occupational safety and health in the nation. The MOLISA Inspectorate is the central authority of the labour inspection system in the country. Labour inspectorates are in charge of ensuring compliance with general working conditions and occupational safety and health legislation, as well as collecting social security contributions and investigating workplace accidents. Inspectors are also in charge of assuring legal conformity with relation to the formation of trade unions in businesses, the negotiation and implementation of collective bargaining agreements, and the resolution of labor disputes.

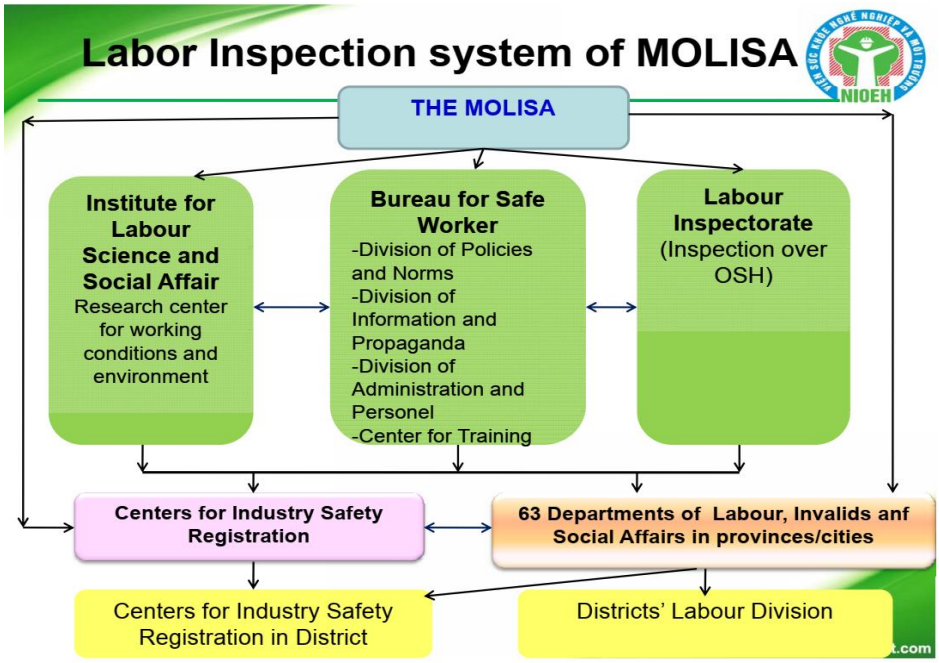

Fig 8. Occupational Health Organization Under MOLISA

In the provincial level, there are organizations called Departments of Labour, Invalids and Social Affairs (DOLISAs). There are 63 DOLISAs at the provincial level. These DOLISA offices further support and monitor 697 district divisions. The planning and programming between MOLISA and the DOLISAs is transparent, systematic, and participatory. MOLISA and DOLISA construct annual inspection plans based on the number of employers in each province, recorded complaints and denunciations, and the previous year's company self-assessment findings. Every year, the MOLISA Inspectorate sets inspection plans for targeted industrial and public sectors, which are subsequently coordinated locally. In addition, the MOLISA Inspectorate deploys district inspectors to work with the DOLISA Inspectorate. DOLISAs also send quarterly and annual reports to MOLISA. On occasion, the MOLISA and DOLISA conduct joint inspection visits.

The Institute of Labour Science and Social Affairs is a scientific research unit under the Ministry of Labour, Invalids and Social Affairs responsible for basic research, strategic and applicable research for State's administration in the field of occupation, vocation, labour, salary, social insurance, labour safety, people who have rendered great service to the country, social sponsor, protecting and taking care of children, gender equality, social evils prevention; managing research activities of the Ministry.The National Institute of Labour Protection is an organization under the Vietnam General Confederation of Labour competent for scientific and technological research on OSH which was appointed by the State. [22]

3.2.National OSH research programme or institute

The National Institute of Labour Protection is the leading national institute in the field of OSH, established under the Decision of the Government, having its budget and laboratory equipment sponsored by the State's budget under the management of Vietnam General Confederation of Labour (VGCL).This is a socio-political organization of the working class, set up to represent, take care and protect the lawful and legitimate rights and interests of workers; to participate in State administration

and social-economic management, in the control and supervision of the State agencies, economic and social entities on issues relating to the rights and obligations of workers.

The National Institute of Labour Protection is financed by the State and has a director who is appointed by the President of the VGCL. In Vietnam, trade union plays an important role in OSH activities.

Four National OSH programmes are approved by the Prime Minister:
1.National programme on labour protection science technology 58.01 phase 1981-1985
2.National programme on labour protection science technology 58 A phase 1986 -1990
3.National programme on labour protection, labour safety and hygiene to 2010
4. National programme on labour safety and hygiene phase 2011-2015

VGCL represents workers and coordinates with relevant ministries to implement the National programme on labour safety and hygiene during 2011-2015. The State assigned the Vietnam General Confederation of Labour to implement Project No. 4 of the programme and Vietnam General Confederation of Labour then assigned the National Institute of Labour Protection to preside it in the name of: "Scientific and technological research and application for labour safety and hygiene". The development of a national OSH programme is foreseen by the OSH Law. The OSH Law requires consultation with trade unions, representative organisations of employers, OSH Councils at all levels in the development and implementation of OSH policies, legislations and programmes.

3.3. Law for OSH

The Law on Occupational Safety and Health, a law specializing in OSH, was enacted in 2015. **(Law No. 84/2015/QH13**).It was passed by the National Assembly of Vietnam on June 25, 2015, which aims to ensure the safety and health of workers by stipulating various requirements for OSH [20.] It will take effect on July 1, 2016. The OSH Law applies to workers with and without labor contracts. A legal system for OSH is currently being built centering on this Law. The law on Occupational Safety and Health includes seven chapters as well as (1) General Provisions; (2) Measures to Prevent and Control Hazardous Factors and Toxic Factors for Workers; (3) Measures to Settle Technical Incidents Causing Occupational Safety and Health Failure and Occupational Accidents and Diseases; (4) Guarantee of Occupational Safety and Health for Special Workers; (5) Guarantee of Occupational Safety and Health in Production and Business Establishments; (6) State Management of Occupational Safety and Health; (7) Implementation Provisions [21].

For detailed rules for implementing the Law, the subordinate rules, such as the Decree specifying and providing guidelines for implementation of certain articles of the law on occupational safety and health and circulars that provide implementing rules for the Decree should be referred to. The Government issued Resolution No. 19/NQ-CP on February 16, 2022, which promulgates the National Program on Occupational Safety and Health for the period of 2021-2025. The Program has set clear and defined objectives to be achieved by 2025. The objective is to achieve an annual reduction of 4% in the number of fatal occupational accidents. To achieve an annual growth rate of 5% in the number of workers undergoing examination for occupational diseases [22].

More than 80% of individuals who have workplace accidents or diseases are eligible to obtain compen

sations and allowances as mandated by the legislation. All instances of deadly workplace accidents shall be documented, examined, and managed, among other actions. In addition, the Program outlines essential objectives and strategies for implementing it, such as enhancing the framework of regulations and legislation and enhancing the ability to scrutinize, assess, and oversee occupational safety and health, as well as deliver public services in this field. Enhancing the dissemination of information, public communication, and training to enhance understanding regarding workplace safety and health. Enhancing research efforts and providing counsel and support to enhance working conditions and prevent and control occupational accidents and diseases. This Resolution becomes effective upon its signing.

3.3.1. Law for Health Check Up

Law No. 84/2015/QH13**,** In Chapter II, section 3 (Labour protection and health care for workers**),** article no 21 (Health check-up and treatment of occupational diseases for workers**)** it's written that [23]:

1. Employers must provide health check-up for workers at least once a year; for workers performing heavy, toxic, hazardous work/occupations or extremely heavy, hazardous, toxic work/occupations, workers with disabilities, minor workers, elderly workers, they must be provided with health check-up at least once every six months.
2. In provision of health check-up as prescribed in Clause 1 of this Article, female workers must get obstetric care, people working in the environment where there are factors likely to cause occupational diseases must receive medical examination for detection of occupational diseases.
3. Employers must organize health check-up for workers before assigning jobs to them and before moving them to heavier, more hazardous, more toxic jobs or after they come back to work from treatment of occupational accidents and diseases, except when there is conclusions of the Medical Assessment Council on the degree of their work ability decrease.
4. Employers must provide health check-up for workers and medical examination for detection of occupational disease at health facilities that meet technical requirements and standards.
5. Employers must take workers who are diagnosed with occupational diseases to health facilities that technical standards for treatment in accordance with the regimens regulated by the Minister of Health.
6. Costs for health check-up, medical examination for detection of occupational diseases, treatment of occupational diseases for workers paid by employers as specified in Clauses 1, 2, 3 and 5 of this Article shall be accounted as deductible expenses upon the determination of taxable incomes according to the Law on Enterprise Income Tax and as recurrent expenditures business in administrative agencies and non-business units with no service activities.

Circular No. 14/2013/TT-BYT, issued by the Ministry of Health on May 06, 2013, provides guidance on medical examination procedures. This Circular provides instructions on the preparation of dossiers, the procedures to be followed, the required contents of medical examinations (ME), the classification of health disorders, and the requirements for medical examination and treatment (ME&T) facilities authorized to conduct ME, including for the workers[24].

There's also Circular No. 19/2016/TT-BYT by MOH about Guideline for occupational health and safety management which mentioned about Occupational Health Record including health certificate or health examination of the employee within are periodic health examination or health examination for detection of occupational diseases and Occupational disease records. This circular also set up

responsibilities from some organization regarding Occupational Health in Vietnam such as HEMA, health stations of districts and responsibilities of preventive healthcare providers, universities having medicine,public health and occupational health faculties for provide and prepare training[25].

3.3.2. Law for Occupational Disease

Law No. 84/2015/QH13, In Chapter III (Measures to Handle Technical Incidents Endangering Occupational Safety and Health and Causing Occupational Accident and Disease), section 1, article 37 about Statistics and reporting on occupational diseases mentioned that all cases of occupational diseases shall be counted and reported under regulations of the Minister of Health. The list of occupational diseases shall be issued by the Minister of Health after consulting the Ministry of Labor, War Invalids and Social Affairs, the Vietnam General Confederation of Labor, employers' representative organizations, and related social organizations, and reviewed for modification and supplementation to suit the changes in the working environment, equipment and technology. In section 2 set up about responsibilities of employers to victims of occupational accidents and diseases (article 37), while in section 3 mentioned about occupational accident and disease insurance regimes including cconditions for receiving compensation for occupational diseases in article.

In particular, Decision No. 26/2017/TT-BLDTBXH concerning the Regulations and Guidelines for the Implementation of Compulsory Labor 6 Accident and Occupational Disease Insurance was issued by the National Assembly of the Socialist Republic of Vietnam in 2017. This ruling mandated that all employees, including officers and career military, officials in cipher organizations, those working under indefinite-term labor contracts, definite-term labor contracts, seasonal labor contracts, or a specific job for a period of three months to less than twelve months, and those working under labor contracts for one month or less than three months, must have occupational disease and accident insurance.

There is also contents of prevention of occupational diseases and health care of employees in Resolution 20-NQ/TU of the Party Central Committee in 2017 on strengthening the protection, care, and improvement of people's health in the new situation and Resolution No. 139/NQ-CP 2017 of the Government. The other is Decision 659/QD-TTg dated May 27, 2020, approving the program to protect, care for and improve workers' health, prevention of occupational diseases in the period of 2020-2030 & Decision 3431/QD-BYT dated July 14, 2021, of the Ministry of Health.

3.4. Institutes related to occupational and environmental health.

The Ministry of Health oversees four institutes that are responsible for various aspects of occupational and environmental health (OH). These institutes include the National Institute of Occupational and Environmental Health (NIOEH), the Institute of Public Health in Ho Chi Minh City, the Tay Nguyen Institute of Hygiene and Epidemiology, the Nha Trang Pasteur Institute, and the

Institute of Marine Medicine. Their functions include research, training, coordination, international cooperation, and service provision in the field of OH.

The unit in charge of implementing the main contents and related units are as follows:

- Department of Health Environment Management
- Departments/Departments: Health Care Management, HIV/AIDS, Food Safety, Mother and Child Protection, Communication, Emulation and Reward, General Plan
- Institutes/Schools: Institute of Human Health and Environment, Pasteur Nha Trang, Ho Chi Minh City Public Health, Hygiene and Epidemiology of Central Highlands, Institute of Nutrition, Medical Universities,
- Institute of Preventive Medicine, Department of Military Medicine, Ministry of National Defense
- Departments of Health, CDC of provinces and cities

3.5. Occupational Disease

3.5.1. Situation of workplace

The total number of enterprises as of December 2022 exceeds 800,000, with the sector of agriculture, forestry, and fisheries accounting for 13.8% of them. The industrial and construction sector accounts for 17.2% of the economy, while the service sector makes up 20.3%.

Around 5 million people across different companies are exposed to risk factors for occupational diseases, making up 53% of the entire workforce. Out of a total of 82.053 enterprises, 52.378, or around 64%, report dangerous and harmful circumstances in the workplace on a yearly basis. Only 11% of companies that have hazardous and harmful components in their operations actually follow the working environment process, whereas 22.6% of these establishments have some level of occupational environment hygiene [26.]

3.5.2. Facility for Occupational Disease Examination

In 2015, there are 50 occupational disease clinics were created in 55 Provincial/City Preventive Medicine Centers, 8 Centers for Occupational Health and Environmental Protection, and 8 Health/Occupational Health Centers at Industrial Branch. This means that not every center has an occupational disease clinic that can do OD detection, diagnosis, and evaluation. The Ho Chi Minh City Center for Occupational Medicine and Environment Protection has the greatest equipment, with

91 devices (82 for OSH and 9 for the clinic for occupational disease examination). Ha Giang province had only one piece of occupational safety and health equipment, a manual dust monitoring meter [27]. Currently, there are 224 units declared eligible for working environment monitoring, and 115 units are licensed to examine and treat occupational diseases.

3.5.3. List Of Occupational Diseases in Vietnam

Article 3 of Circular 15/2016/TT-BYT specifies 34 occupational diseases covered by social insurance, as well as diagnostic and examination guidelines, as follows:

1. Occupational silicosis and instructions for diagnosis and assessment are specified in Appendix 1 issued with this Circular.
2. Occupational asbestosis and guidance on diagnosis and assessment are specified in Appendix 2 issued with this Circular.
3. Occupational pneumoconiosis and instructions for diagnosis and assessment are specified in Appendix 3 issued with this Circular.
4. Occupational talc pneumoconiosis and instructions for diagnosis and assessment are specified in Appendix 4 issued with this Circular.
5. Occupational coal pneumoconiosis and instructions for diagnosis and assessment are specified in Appendix 5 issued with this Circular.
6. Occupational chronic bronchitis and instructions for diagnosis and assessment are specified in Appendix 6 issued with this Circular.
7. Occupational asthma and instructions for diagnosis and assessment are specified in Appendix 7 issued with this Circular.
8. Occupational lead poisoning and instructions for diagnosis and assessment are specified in Appendix 8 issued with this Circular.
9. Occupational poisoning caused by benzene and its analogues and instructions for diagnosis and assessment are specified in Appendix 9 issued with this Circular.
10. Occupational mercury poisoning and guidance on diagnosis and assessment are specified in Appendix 10 issued with this Circular.
11. Occupational manganese poisoning and instructions for diagnosis and assessment are specified in Appendix 11 issued with this Circular.
12. Occupational trinitrotoluene poisoning and instructions for diagnosis and assessment are specified in Appendix 12 issued with this Circular.
13. Occupational arsenic poisoning and instructions for diagnosis and assessment are specified in Appendix 13 issued with this Circular.
14. Occupational pesticide poisoning and guidance on diagnosis and assessment are specified in Appendix 14 issued with this Circular.
15. Occupational nicotine poisoning and instructions for diagnosis and assessment are specified in Appendix 15 issued with this Circular.
16. Occupational carbon monoxide poisoning and instructions for diagnosis and assessment are specified in Appendix 16 issued with this Circular.
17. Occupational cadmium poisoning and instructions for diagnosis and assessment are specified in Appendix 17 issued with this Circular.
18. Occupational deafness caused by noise and guidance on diagnosis and assessment are specified in Appendix 18 issued with this Circular.
19. Occupational decompression disease and guidance on diagnosis and assessment are specified in Appendix 19 issued with this Circular.

20. Occupational diseases caused by whole-body vibration and guidance on diagnosis and assessment are specified in Appendix 20 issued with this Circular.
21. Occupational diseases caused by local vibration and guidance on diagnosis and assessment are specified in Appendix 21 issued with this Circular.
22. Occupational radiation disease and guidance on diagnosis and assessment are specified in Appendix 22 issued with this Circular.
23. Occupational cataracts and guidance on diagnosis and assessment are specified in Appendix 23 issued with this Circular.
24. Occupational oily nevus disease and guidance on diagnosis and assessment are specified in Appendix 24 issued with this Circular.
25. Occupational skin darkening and guidance on diagnosis and assessment are specified in Appendix 25 issued with this Circular.
26. Occupational contact dermatitis caused by chromium and guidance on diagnosis and assessment are specified in Appendix 26 issued with this Circular.
27. Occupational skin diseases caused by prolonged exposure to wet and cold environments and guidelines for diagnosis and assessment are specified in Appendix 27 issued with this Circular.
28. Occupational skin diseases caused by contact with natural rubber, chemical rubber additives and guidance on diagnosis and assessment are specified in Appendix 28 issued with this Circular.
29. Occupational Leptospira disease and guidance on diagnosis and assessment are specified in Appendix 29 issued with this Circular.
30. Occupational hepatitis B virus and guidelines for diagnosis and assessment are specified in Appendix 30 issued with this Circular.
31. Occupational tuberculosis and guidance on diagnosis and assessment are specified in Appendix 31 issued with this Circular.
32. HIV infection due to occupational accidents and guidance on diagnosis and assessment are specified in Appendix 32 issued with this Circular.
33. Occupational hepatitis C virus and guidance on diagnosis and assessment are specified in Appendix 33 issued with this Circular.
34. Occupational mesothelioma and guidelines for diagnosis and assessment are specified in Appendix 34 issued with this Circular.

On February 9, 2023, the Minister of Health of Vietnam issued Circular No. 02/2023/TT-BYT amending Circular No. 15/2016/TT-BYT on occupational disorders covered by social insurance. According to the Circular, "occupational COVID-19" has been added to the list of occupational disorders covered under social insurance. At the same time, Appendix 35 with guidelines for occupational COVID-19 diagnosis and assessment has been introduced. As a result, as of April 1, 2023, social insurance covers 35 occupational disease.

3.6. Statistic

3.6.1. Health Check-Up

Every year, close to 2 million workers have regular health check-up examinations. In those years, 9.6% of the total cases consisted of workers classed as having weak health (category 4, 5).

Time	Total	Type 1	Type 2	Type 3	Type 4	Type 5
2016-2020	9.256.271	2.273.248	4.040.830	2.061.012	709.302	171.876
	Percentage	24.6	43.7	22.3	7.7	1.9

Table 5. Results of periodical health examination for employees in the period 2016-2020.

3.6.1. Occupational Disease Data

According to the annual report on occupational health, approximately 100,000 to 300,000 workers undergo occupational illness examination each year in order to identify and diagnose occupational disorders. In 2019, occupational illness detection was conducted in 45 out of the 63 provinces across the country, specifically targeting 27 out of the 34 compensated occupational disorders. A total of 243,218 workers employed in hazardous environments underwent examinations for occupational illnesses, resulting in the detection of 7,265 cases (accounting for 3% of the evaluated workers).

In the periode of 1996-2020, the trends shows that the groups of occupational disease coming from physical hazard such as noise and followed by lung disease group, occupational skin, intoxication and bacterial infections.

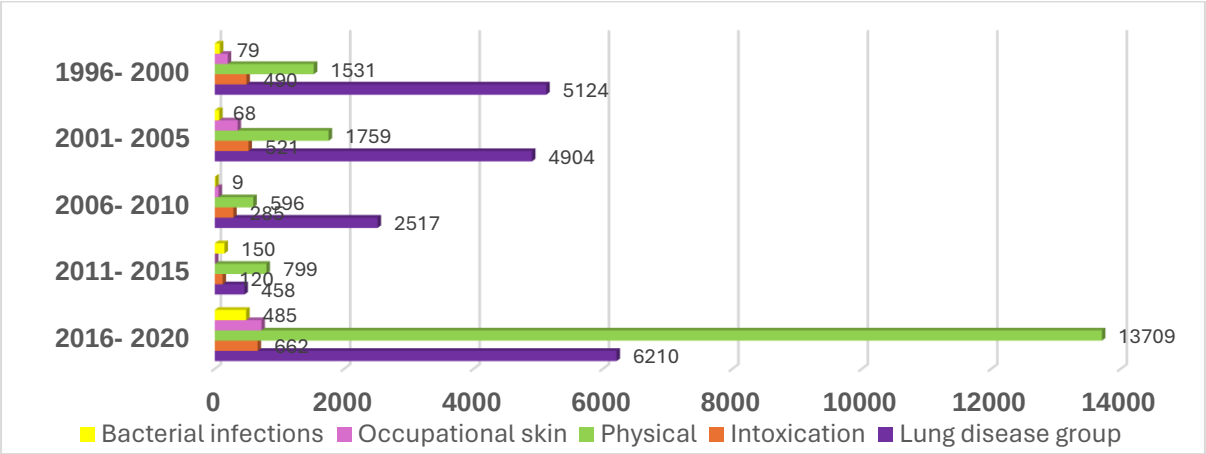

Fig 9. Trends of occupational disease groups in the period 1996 – 2020

TT	Occupational diseases name	2016	2017	2018	2019	2020	2021	2022	Accumulate and receive social insurance
1	Silicosis	332	310	596	104	221	62	24	*21.407*
2	Asbestos pneumoconiosis	0	0	0	0	0	0	0	*3*
3	Cotton pneumoconiosis	0	0	0	0	0	0	0	*278*
4	Talc pneumoconiosis	0	79	71	0	0	0	0	*0*
5	Coal worker pneucomoniosis	69	0	0	424	304	0	254	*734*
6	Occupational bronchitis	165	0	0	1.035	1270	0	0	*121*
7	Chronic bronchial asthma	1	455	350	424	0	0	0	*0*
8	Lead poisoning and lead compounds	0	0	7	41	0	0	0	*321*
9	Occupational benzene poisoning disease	0	0	1	74	142	0	0	*2*
10	Mercury poisoning disease	0	0	0	0	0	0	0	*24*
11	Manganese poisoning disease	0	0	0	0	0	0	0	*0*
12	TNT poisoning disease	0	0	0	0	0	0	0	*535*
13	*Occupational arsenic poisoning*	0	0	0	0	0	0	0	*0*
14	Plant protection chemicals poisoning	14	0	0	14	0	0	0	*297*
15	Nicotine Intoxication	46	40	38	15	0	0	0	*260*
16	Carbon monoxide poisoning disease	105	0	0	0	0	0	0	*0*
17	*Cadmium poisoning disease*	0	0	0	0	0	0	0	*0*

TT	Occupational diseases name	2016	2017	2018	2019	2020	2021	2022	Accumulate and receive social insurance
18	Noise-induces hearing loss	2105	2766	2.354	4.253	1545	181	992	*5.249*
19	Decompression disease	0	0	0	6	0	0	0	*0*
20	Diseases caused by systemic vibration	225	0	0	3	0	0	2	*20*
21	Diseases caused by local vibration	14	0	0	0	0	0	0	*0*
22	Radiation disease	0	0	58	152	228	0	0	*15*
23	Occupational cataracts	0	0	0	0	0	0	0	*0*
24	Occupational oil acne diseasae	0	0	23	0	0	0	0	*0*
25	Occupational melanosis	142	129	25	89	11	0	17	*633*
26	Contact dermatitis due to crom	0	0	0	0	0	0	0	*0*
27	Skin disease caused by prolonged wet and cold environmental exposure	0	0	9	282	11	0	9	*0*
28	Skin diseases caused by exposure to natural rubber and chemicals	0	0	0	0	0	0	0	*0*
29	Occupational tuberculosis	5	5	3	0	0	5	15	*91*
30	Occupational viral hepatitis B	40	7	0	69	1	1	15	*287*
31	Occupational lestospira torsion	4	10	0	279	24	0	0	*6*
32	Occupational HIV/AIDS	1	0	0	0	0	0	0	*1*
33	Occupational viral hepatitis C	1	1	0	1	6	0	0	*0*
34	Occupational mesothelioma	0	0	0	0	0	0	0	*0*
	Tổng	**3269**	**3802**	**3535**	**7265**	**3763**	**249**	**1328**	**30.284**

Table 6. Occupational diseases in the period 2016-2022

In the table above describes that out of a total case of occupational diseases during those years, the highest rate was attributed to occupational deafness. This was followed by lung disease group such as occupational chronic bronchitis, silicosis and chronic bronchial asthma.

4. Conclusion

Vietnam is one of the countries in Southeast Asia that has great potential for rapid development in the future with a large human resource capacity. Despite ongoing economic developments, a significant number of Vietnamese workers continue to opt for migration to foreign

nations. Currently, in addition to Asian countries, they are also extending their presence to many European and Australia.

Meanwhile, the organization and law of occupational health in firms has been strengthened in this country. In addition, they have implemented socialization efforts to enhance the scope of occupational health service delivery, as demonstrated by the outcomes of medical check-up examinations and statistics on workers affected by occupational diseases in the nation. Nevertheless, there is a need to enhance the capacity of health facilities and medical personnel involved in occupational health. We lack comprehensive data regarding hospitals and clinics that possess the necessary medical tools to diagnose and treat workers suffering from occupational disorders, particularly for pneumoconiosis.

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令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

健康管理手帳制度による健康診断のフィリピンでの実施のための研究

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研究要旨

【目的】

フィリピンは 117.3 百万人の人口を抱える東南アジアの島嶼国家で、世界でも有数の移民送出国である。国連の推計によるといわゆる「移民」の数は 6 百万人を超えており、海外在住者が人口の 5%を占めている事になる。東南アジア唯一の英語圏国家ではあるが、渡航先はサウジアラビア、UAE など中東諸国が半数を占めている。本調査は、日本で就労するフィリピン人労働者が、帰国後に健康管理手帳制度による健康診断を受診する余地があるかを検討することを目的とする。

【方法】

フィリピンの労働安全衛生分野の専門家とオンライン MTG を行い、健康管理手帳制度による健康診断を実施可能な医療機関の有無等について議論した。

【結果】

会議では、フィリピンの医療施設の有無や日本との制度の違いについて話し合われた。フィリピン側は医療制度の違いを指摘し、日本のような検診制度はないと述べた。プロジェクトの進捗状況は申請書が承認されていると報告され、他国での展開可能性が調査される段階にあることが明らかにされた。フィリピン側の参画には正式な組織間協定が必要であり、全国労働衛生団体連合会や高知大学との協定が提案された。フィリピン人労働者の健康管理手帳制度による健康診断の実施可能性について、継続的なコミュニケーションや研究計画書の改訂が議論された。

【考察】

調査研究の進展により、日本で働いたフィリピン人労働者が帰国後に健康管理手帳による健康診断を受診する可能性を模索するために、医療制度の比較調査や法的規制の調査が必要であり、協力体制の構築と利害関係者との意見交換が引き続き必要である。

A. 研究目的

フィリピンは、面積 300,000 平方キロメートルの東南アジアの島嶼国家で、117.3 百万人の人口を抱える。フィリピ

ンの GDP は 4,000 億米ドル程度で、その 6 割程度をコールセンター業務などの「ビジネス・プロセス・アウトソーシング（BPO）産業」、3 割程度を「鉱工業」が占める。
国連の推計によるといわゆる「移民」の数は 6 百万人を超えており、海外在住者が人口の 5%を占めている事になる。在外フィリピン人からの本国への送金額は GDP の 1 割程度の規模に相当し、フィリピン経済に大きな影響力を有する。東南アジア唯一の英語圏国家ではあるが、渡航先はサウジアラビア、UAE など中東諸国が半数を占めている。日本で働くフィリピン人労働者は外国人労働者の中で、ベトナム、中国に次ぐ全体３位で 20 万人以上が働いているものの、フィリピンの移民労働者全体からすると 4%程度に過ぎず、フィリピン人の就労先として日本の位置付けは高くない。
本調査は、今後国内で増加が予想されるフィリピン人労働者が、帰国後に健康管理手帳制度による健康診断を受診する余地があるかを検討することを目的とする。

B. 研究方法

フィリピンで労働安全衛生行政を主管する労働雇用局の労働安全衛生センターの専門家とオンライン MTG を行い、健康管理手帳制度による健康診断を実施可能な医療機関の有無等について議論した。

日時：2024 年 3 月 4 日
会議出席者：
Engr. Jose Maria S. Batino, CESO IV, OIC-Executive Director
Dr. Maria Beatriz G. Villanueva, MD, MOH, PhD, Division Chief, Health Control Division (HCD), Occupational Safety and Health Center (OSHC)
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菅沼成文　高知大学医学部環境医学教室
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角田都 高知大学医学部環境医学教室（コーディネーター）

C. 研究結果

会議では、フィリピンにおける医療施設の有無についての質問や、日本との制度の違いについての議論が行われた。フィリピン側からの指摘によれば、フィリピ

ンの医療制度は日本と異なり、日本のような医療検診制度は存在しないことが明らかにされた。
また、プロジェクトの進捗状況については、すでに申請書が承認されていることが報告された。日本側からの説明では、このプロジェクトは他国での展開可能性を調査する段階にあることが強調された。
フィリピン側がプロジェクトに参画するにあたっては、正式な組織間協定の締結が必要であることが提示された。政府の財源で行なっている調査なので、所管官庁から依頼文書を出してもらうのが望ましい、という意見も出たが、現実的ではないため、全国労働衛生団体連合会や高知大学との間で協定を結ぶことが提案された。
フィリピン人労働者の健康管理手帳制度による健康診断の実施可能性を検討するため、引き続き継続的なコミュニケーションと研究計画書、質問票改訂などの可能性について議論された。

D. 考察

調査結果から、日本で働いたフィリピン人労働者が帰国後に健康管理手帳による健康診断を受診する余地があるかをさらに調査研究する上での考察を述べると、以下の点が挙げられる。

医療制度の比較調査: フィリピンと日本の医療制度を詳細に比較し、両国での健康診断の実施可能性を明らかにする必要がある。特に、日本の健康管理手帳制度とフィリピンの健康診断制度の相違点を把握することが重要である。
法的規制の調査: 日本で働いたフィリピン人労働者が帰国後に健康管理手帳による健康診断を受ける際の法的規制や手続き上の障壁を調査する必要がある。
協力体制の構築: フィリピンの関連機関や日本の厚生労働省との協力体制を構築し、帰国後の健康管理手帳による健康診断の実現可能性に向けた具体的な支援策を検討する必要がある。これには、正式な組織間協定の締結や情報交換の仕組みの整備が含まれる。
利害関係者との意見交換: フィリピン人労働者や関連する団体・組織との意見交換を通じて、彼らのニーズや課題を把握し、それに基づいて適切な支援策を提供する必要がある。

以上の点を考慮し、引き続きの調査研究を進めることで、日本で働いたフィリピン人労働者が帰国後に健康管理手帳による健康診断を受診する余地についてより具体的な答えを見出すことができるであろう。

E. 結論

フィリピンと日本の制度の違いにもか

かわらず、両国での協力が可能であるとの見解が示された。本調査を通じて、フィリピンでの調査を進める上で必要となる連絡担当候補者を立てることができた。フィリピンにおけるOSHサービスの提供システム及び品質保証システムについての文献調査、健康診断実施病院候補リストの収集、病院調査の実施は次年度以降の課題となった。

F. 健康危険情報

該当なし

G. 研究発表

該当なし

H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得

該当なし

2. 実用新案登録

該当なし

令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

健康管理手帳制度による健康診断のネパールでの実施のための研究

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研究代表者:菅沼　成文　全国労働衛生団体連合会
胸部X線検査専門委員会委員
研究分担者:田村　太朗　島根大学　医学部　准教授
JP Naw Awn　高知大学　医学部　特任助教

研究要旨

【目的】

移民労働者は送金を通じてネパールの GDP に大きく貢献している。ネパールの人口の多くが海外雇用に従事している。労働力には熟練労働者と非熟練労働者の両方が含まれ、大多数が建設、接客、製造、家事サービス部門で働いている。労働移動プロセスを規制・管理するため、ネパール政府は、ネパール人移民労働者の採用、訓練、福祉を監督する様々な政策や健康診断システムを確立してきた。海外就労中および海外就労からネパールに帰国した後の健康を確保するための支援体制は不十分であった。本研究の目的は、ネパールにおける労働安全衛生（OSH）制度を評価し、海外労働から帰国した移民労働者が健康診断、治療、リハビリテーションを必要とする場合の支援システム開発の可能性を探ることである。

【方法】

ネパールの移民労働者管理、ヘルスケアシステム、OSH サービスの提供システム、及び品質保証システムの現状について文献調査を行った。また、ネパールで働く OSH の専門家に構造化質問票を用いてインタビューを行った。

【結果】

労働・雇用・社会保障省（MoLESS）は、国内の OSH を含む労働移動を規制する最高機関である。OSH は MoLESS にとって優先順位の低い分野に位置付けられており、そのため OSH の管理体制が弱く、人材不足が深刻である。入国前のメディカルチェックを認可された医療機関はあり、本調査を通じて 284 院をリストアップした。しかし、海外就労から帰国した労働者の健康ニーズに対応する機能的なシステムはない。

【考察】

MoLESS と保健・人口省（MOHP）の間には何の連携もない。国内には、定年退職後の労働者、職業性疾患の健康診断、治療、リハビリテーションのための統合システムは規定されていない。

A. 研究目的

ネパールは南アジアの内陸国で、147,516 平方キロメートルの国土を有し、北は中国、南、東、西はインドに隣接している。ネパールの人口は 2021 年に 2,970 万人に達した。2011 年以来、ネパールの人口は約 10%増加している。2022 年の一人当たり GDP は 1083 米ドルである。経済調査 2022/23 によると、ネパールの人口の約 15%が貧困線下にある。ネパールの移民労働者数は人口の 2 割に相当する約 600 万人となっており、そのうち 9 割はマレーシア、カタール、サウジアラビア、UAE に集中している。我が国におけるネパール人労働者については、厚生労働省が発表した 2023 年 10 月末の国籍別・在留資格別外国人労働者数によると、14.6 万人と全体の約 7%を占めている。これは、外国人労働者総数で見ると、ベトナム、中国、フィリピンに次ぐ全体の 4 位に位置している。4 人に 1 人が専門的・技術的分野の在留資格で就労しているものの、全体の約 2/3 が資格外活動で、特に留学が 6 万人となっており、語学学校に通いつつ、アルバイトとして働く移民労働者が多くを占めるものと推察される。2024 年 1 月 1 日に、法務省、外務省、厚生労働省とネパール国労働・雇用・社会保障省との間で、技能実習に関する二国間取決め（協力覚書：MOC）が締結されたことから、今後は技能実習での就労者が増加することが予想される。

このような労働移民の健康は、帰国後の健康を保証するシステムがないため、国にとって課題となっている。ネパールの医療制度は、不十分なインフラ、特に農村部における医療従事者の不足、地理的な問題による医療サービスへのアクセスの悪さ、社会的・経済的障壁、医療保険制度が未成熟であるなどの課題にしばしば直面している。本研究の目的は、ネパールにおける労働安全衛生（OSH）制度を評価し、海外労働から帰国した労働移民が健康診断、治療、リハビリテーションを必要とする場合の支援システム開発の可能性を探ることである。

B. 研究方法

研究目的に基づいて 2 つの研究課題を設定した。

1. ネパールにおける OSH サービスの提供システムとは何か？
2. ネパールにおける OSH サービスの品質保証システムとは何か？

研究課題に基づいて、OSH、職業性疾患、労働法、労働移動などのキーワードを特定した。また、ネパール政府の公式ウェブサイトを通じて、ネパール政府の政策文書や報告書を調査した：

https://moless.gov.np/np

https://www.oshc.gov.np/

https://mohp.gov.np/en/

https://censusnepal.cbs.gov.np/results

さらに、その他の文書、研究論文、出版済みおよび未発表の報告書も使用した。さらに、構造化質問票を用いて労働者 1 名にインタビューを行った。

C. 研究結果

ネパールにおける OSH サービスの提供システム

労働・雇用・社会保障省（MoLESS）は、ネパールの OSH の最高機関であるが、MoLES にとって OSH の優先順位は低い。そのため、OSH を監督・管理するための組織体制は弱く、人材不足も深刻である。保健・人口省（MOHP）と MoLESS の間には機能的なつながりはない。現在の OSH サービスの提供システムは、労働者の健康管理、工場検査、労働検査を規定したネパール労働法によって規定されている。国内の職業性疾患や職業傷害の全体的な発生率／有病率に関する統計は、移民労働者向けのサービスも含め、アクセスしやすい形式では十分にまとめられていない。職業性疾患を専門的に管理する組織が存在しないため、職業性疾患は一般的な保健サービスの枠組みの中で管理されている。

ネパールにおける OSH サービスの品質保証システム

アスベストを含む有害物質にさらされた労働者に対する特別な健康診断制度はない。職業性疾患の調査に使用される X 線写真などの診断ツールに関する基準もない。OSH サービスの品質保証に寄与する規制組織は、作業環境測定と労働者の健康診断関連のものに限られている。

移民労働者の健康診断を実施している医療機関

移民労働者は MOHP が認める政府公認の医療センターで事前健診を受けなければならない。本調査を通じて、この事前健診を行っている医療センターとして、284 院をリストアップした。医療センターの大部分は、ネパールの首都カトマンズを含むバグマティ県に位置する（表 1）。コシ県には約 10%の医療センターがある一方で、カルナリ県には医療センターがない。医療センターの大部分は独立した研究所で、外来患者サービスのみを提供し、入院患者サービスはない。

表 1 移民労働者の事前健診を行っている医療センターの分布

	N = 284
州	
コシ州	28 (10%)
マデシ州	3 (1%)
バグマティ州	241 (85%)
ガンダキ州	3 (1%)
ルンビニ州	8 (3%)
カルナリ州	0 (0%)
スドゥパシュチム州	1 (1%)

表 2 移民労働者の診察を行っている医療機関の分布

番号	医療機関名	州	ベッド数
1	Norvic International Hospital	バグマティ州	200
2	Grande International Hospital	バグマティ州	200
3	Ciwec Hospital Pokhara	ガンダキ州	25
4	Mediciti Hospital	バグマティ州	700
5	Neuro Hospital (National Institute of Neurology)	バグマティ州	100
6	Manipal College of Medical Science	バグマティ州	700
7	CIWEC Clinic	バグマティ州	25
8	IOM Nepal Migration Health Assessment Center	バグマティ州	0

上記の病院は、ネパールへの外国人移住者や旅行者の健康診断で最もよく知られている三次病院で、いずれも複数の専門科を有している。

D. 考察

調査結果に基づき、取り組むべき課題として以下の点が浮かび上がった。

- ネパールにおける OSH サービスの提供システムは、労働者の作業環境測定・健康診断に限られている。
- ネパールにおける OSH サービスには、機能的な品質保証システムが欠如している。

E. 結論

ネパールでは、若者の多くが海外に出稼ぎに行き、日常生活を送っている。しかし、国内の労働力に対するサービスは不十分で、移民労働者に対するサービスは出国前の事前健診に限られている。本調査を通じて、ネパールでの調査を進める上で必要となる連絡担当者を立てることができた。また、ネパールにおける OSH サービスの提供システム及び品質保証システムについての文献調査を終えることができた。一方で、ネパールの病院調査の実施は次年度以降の課題となった。

F. 健康危険情報

該当なし

G. 研究発表

該当なし

H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得

該当なし

2. 実用新案登録

該当なし

Status of Occupational Safety and health and Quality Assurances of Related Services in Nepal

Overseas Health Checkup Initiative

MAY 14, 2024

EIJAY MAHARJAN
Department of Environmental Medicine, Kochi University, Japan

Contents

Abbreviations

AHMIS	-Ayurveda Health Management Information System
CDO	- Chief District Officer
COVID-19	- Corona virus
CSO	- Civil Society Organizations
DDA	- Department of Drug Administration
DIN	-Drug Information Network
DoAA	- Department of Ayurveda and Alternative Medicine
DoEF	- Department of Foreign Employment
DoHS	- Department of Health Services
EHRs	- Electronic health records
EPF	- Employees Provident Fund
EWARS	-Early warning and Reporting System,
FCHV	- Female Community Health Volunteers
FMIS	-Financial Management Information System
GCC	-Golf Cooperation Council
GEFONT	-General Federation of Nepalese Trade Unions
HIIS	-Health Infrastructure Information System
HMIS	- Health Management Information System
HuRIS	-Human Resource Information System,
ILO	-International Labour Organization
LEO	- Labour Employment office
LLGs	- Local Level Government
LMIS	- Logistics Management Information System
MDIS	-Malaria Disease Information System
MIS	- Management Information Systems
MoHP	- Ministry of Health and Population
MoLESS	- Ministry of Labour, Employment, and Social Security
MoSD	- Ministry of Social Development
MPH	- Masters in Public Health
MSS	-Minimum Service Standards

NHPC	- Nepal Health Professional Council
NMC	-Nepal Medical Council (NMC)
OOP	- Out-of-Pocket
OSH	-Occupational Safety and Health
OSHP	-Occupational Safety and Health Project
PHC	-Primary Health Care Centres
PLAMAHS	- Planning and Management of Assets in Health Care System
QAAS	-Quality Assurance and Accreditation Section
SSF	- Social Security Fund (SSF)
TIMS	-Training Information Management System,
UK	- United Kingdom
UN	-United Nations
WHO	- World Health Organizations

1. **General Information of Nepal**

1.1 Nepal Geographic

The Federal Democratic Republic of Nepal is a landlocked country located in South Asia with China in the north and India in the south, east and west. The country occupies 147,516 sq. km of land and lies between coordinates approximately 28°N and 84°E. Within a short distance, Nepal's topography changes from the alluvial Gangetic plains suitable for agriculture to the frozen lands of the Himalayan mountains. Between the two extremes lie the middle hills. There are several inner Himalayan valleys with desert conditions located at altitudes above 3,600m.

Figure: 1 Map of Nepal

The country is divided into three geographical zones, i.e. Terai (plain), hills and mountains. Nepal is divided into 7 provinces 77 districts and 753 local units including 6 metropolises, 11 sub-metropolises, 246 municipal councils and 481 villages. Kathmandu is the nation's capital and largest city. (1)

1.2 Nepal Population

Nepal is a low-income country situated between China and India. The population of Nepal reached 29.7 million in 2021. Since 2011, Nepal's population has grown by 10.18%. However, the average annual growth rate is 0.93%, a decrease from the data reported in the census report of 2001-2011, which presented a growth rate of 1.35%. The annual population growth is 1.35%. The Gross Domestic Product per capita is US$1083 in 2022. According to the Economic Survey 2022/23, 15.1% of Nepal's population is under the poverty line and the Gini coefficient is about 58.5. The Human Development Index value is 0.602 in 2022. The crude birth rate is 20.0 per 1000 population. The crude death rate is 7.3. The total fertility rate is 2.1. The infant mortality rate is 28 per 1000 live births and the mortality rate under 5 years of age is 33 per 1000 live births. Life expectancy at birth years has improved from 65.3 years in 2000 to 70.9 years in 2019. The fertility rate in Nepal has declined over the years, from 2.516 in 2011 to 1.853 in 2021. (1)

Nepal had the largest population group with 66.8% of the population falling into the working-age group of 15-64 years. Below 15 years, was the second with 27.4% and 65 years and above was the third with 5.8% of the total population in 2021. There is a population of 23958868 aged 10 years and above in the country of which, 65.5% are economically active while 34.5 are economically inactive. The main sector of the work is agriculture (57.3%), followed by wholesale and retail trade (12.5%), construction (8.1%), manufacturing (3.8%), transportation and storage (2.2%), accommodation and food service (1.7%). About 0.2% are only engaged in the mining and quarrying sector. (2)

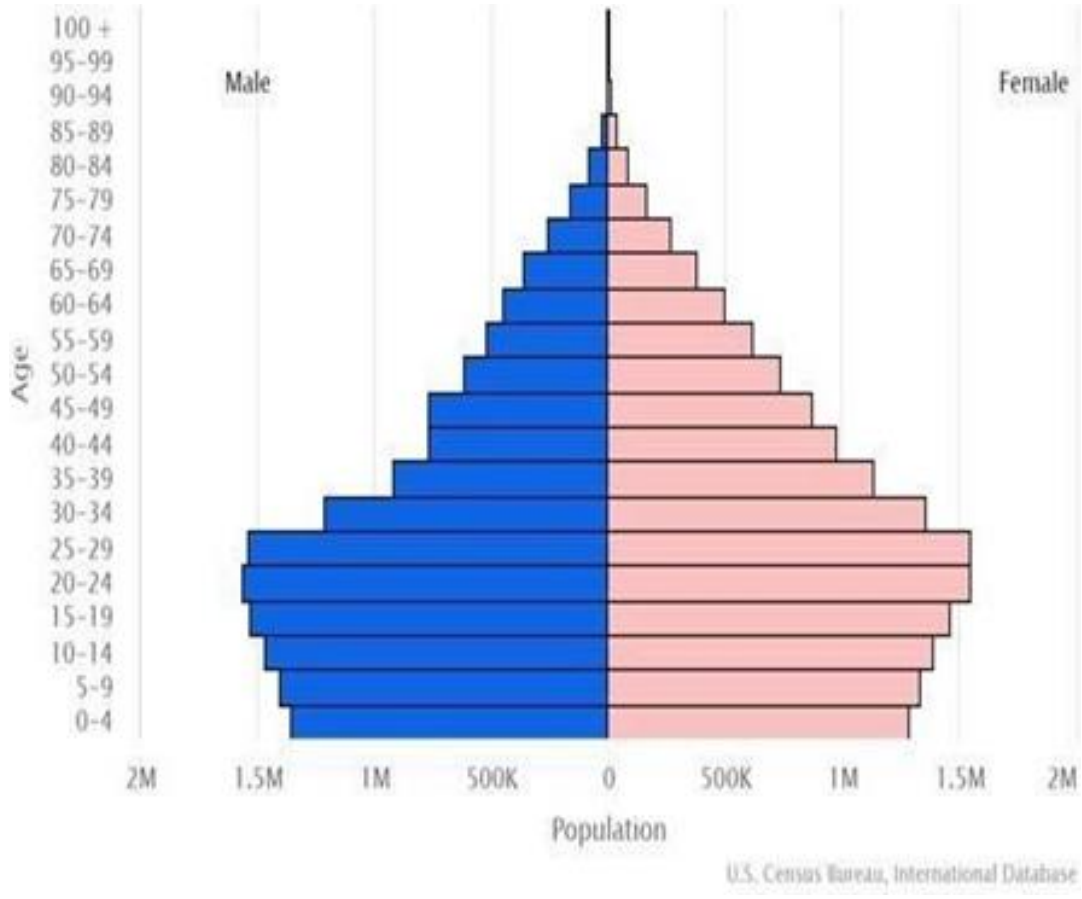

Figure: 2 Population Pyramid of Nepal

Export of workers has driven Nepal's notable pro-poor economic growth: personal remittances reached 25% of GDP in 2020, contrasted with meagre foreign direct investments at 0.4% of GDP. The labour income share fell, and labour productivity with weak progress during the 2010s. There are slight shifts in the structural employment status backed by a tailwind from the service sector. The urbanisation rate stands far below the neighbouring countries. The relatively low unemployment rate at around 5.1% in 2021 is shadowed by a broader underutilization rate of 39%.(3)

Table 1: Socio-demographic indicators of Nepal

Indicators	**Value**	**Year**
1.1.1: Working poverty rate (%age ofemployed living below US$1.9 PPP).	3.4%	2021
1.3.1: The population is effectively covered by a social protection system, including socialprotection floors.	17% *	2020

5.5.2: Proportion of Women in senior andmiddle management positions	14%	2017
5.5.2: Proportion of women in managerial positions	13%	2017
8.2.1: Annual growth rate of output per worker (GDP constant 2011 international $ inPPP).	-3.6%	2021
8.3.1: Proportion of informal employment innon-agriculture employment.	78%	2017
8.3.1: Women	82%	2017
8.3.1: Men	75%	2017
8.5.1: Average hourly earnings of women and men employees.	US$1.1	2017
8.5.2: Unemployment rate (Total, 15+)	11%	2017
8.5.2: Women, 15+	13%	2017
8.5.2: Women, 15-24 years	24%	2017
8.5.2: Men, 15+	10%	2017
8.5.2: Men, 15-24 years	20%	2017
8.6.1: Proportion of youth (15-24 years) not in education, employment, or training).	35%	2017
8.7.1: Proportion and number of children aged 5-17 years engaged in economic activity (Total).	19%	2014
8.7.1: Girls	19%	2014
8.7.1: Boys	19%	2014
8.1.1: Non-fatal occupational injuries per100,000 workers	-	-
8.8.1: Fatal occupational injuries per 100,000workers.	-	-
8.8.2: Level of national compliance with labour rights (freedom of association andcollective bargaining)	-	-
9.2.2: Manufacturing employment as a proportion of total employment.	15%	2017
10.4.1: Labour income share as a % of GDP.	37%	2017

1.3 Nepal Labour

1.3.1 General

Nepal has the largest population group with 66.8% of the population falling into the working-age group of 15-64 years. Below 15 years, is the second largest group with 27.4% and 65 years and above was the third largest group with 5.8% of the total population in 2021. There is a population of 23958868 aged 10 years and above in the country of which, 65.5% are economically active while 34.5% are economically inactive. The main sector of work is agriculture (57.3%), followed by wholesale and retail trade (12.5%), construction (8.1%), manufacturing (3.8%), transportation and storage (2.2%), accommodation and food service (1.7%). About 0.2% are only engaged in the mining and quarrying sector.

1.3.2 Social Insurance

Nepal has a long and successful history of provident funds that dates back to 1934 and programs such as the Employees Provident Fund (EPF) have been in the collective memory of the citizens for a few decades. The introduction of mandatory social insurance through the Contribution-based Social Security Act (2017) implemented by the Social Security Fund (SSF), is more recent. The coverage of the existing contribution-based social security programme is less than 15 % of all workers, and the covered are mainly civil servants. (4)

1.3.3 Unemployment Insurance

The unemployment rate for youth aged 15-29 is 19.2% compared to 2.7 per cent for the whole population. Over 400,000 young people are estimated to enter the Labour force every year. These figures indicate the quantitative dimension of the employment challenge in Nepal. However, the unemployment insurance has not been initiated so far. (5)

1.3.4 Organization

Established in 1989, the General Federation of Nepalese Trade Unions (GEFONT), with 27 affiliated union members nationwide, works as an umbrella organization for various trade unions in the fields of agriculture, industry and service sectors. In 2007, with an effort to examine the issues of occupational safety and health through social dialogues with industrial stakeholders in the country.

1.3.5 Labour Migration of Nepal

Nepal has continued to prioritise entering into and renewing bilateral labour migration agreements (BLMAs) with various labour destinations to ensure the safe, orderly and dignified migration of Nepali migrant workers. Between 2019/20 and 2021/22, more than 1.1 million Labour approvals were issued. While the number of Labour approvals issued saw a significant decline in the COVID-19 years of 2019/20 and 2020/21, there was a revival in 2021/22 when the impacts of the pandemic gradually subsided. Nepal welcomed back 203,934 returnees in 2020/21 and 470,978 in 2021/22. Labour migration from Nepal is still a phenomenon dominated by men with women migrant workers accounting for less than 10 per cent of the total labour approvals issued in 2021/22. Madhesh and Province 1 account for the largest share of migrant workers, with each being home to more than a fifth of the total Labour approvals issued in 2021/22. In contrast, Bagmati accounts for the largest share of women migrant workers in foreign employment. (6)

Informality affects countries in this region at varying degrees of economic development, and new forms of work continue to bring challenges on this front even in countries that have made substantial progress. Low- and middle-income countries continue to have elevated levels of informal employment. For instance, Nepal's informal employment rate was around 82% in 2017 and Pakistan's around 84% in 2021 (ILO 2023). The incorporation of effective occupational safety and health (OSH) measures in the informal economy units needs to be considered as an immediate action to protect workers' health and improve their standards of living. It also has to be considered part of a transitional strategy aimed at contributing to poverty alleviation and formalization by combining measures for strengthening the conditions and principles which regulate labour relations, working conditions, OSH and employment opportunities, to allow for economic integration, social cohesion and decent work for all. Identifying the nature, diversity and extent of the informal economy in each country is a complex task. As the informal economy is not covered by national recording, notification and compensation systems, there is scarce information on occupational accidents and diseases arising from hazardous working conditions which could be used for the identification of priority areas for prevention. The magnitude and rate of growth of the informal economy are difficult to establish.

While Nepali citizens migrated to 150 countries between 2019/20 and 2021/22 for employment, the six GCC countries and Malaysia remain the preferred destinations for the overwhelming majority of Nepali migrant workers in the reference period. Countries like Croatia, Cyprus, the Maldives, Malta, Poland, Romania, Turkey, and the UK have also emerged as important employment destinations in the last few

years. Between 2019/20 and 2021/22, although most of the women Nepali migrant workers went to the GCC countries, countries like Croatia, Cyprus, Jordan, Malta, Romania and Turkey were the more prominent, and emerging destinations for women compared to men. (6)

Table 1: List of countries approved for Foreign Labour Migration

S.No.	Country	S.No.	Country	S.No.	Country
1	Afghanistan*	38	Guana	75	Nigeria
2	Albenia	39	Holysee	76	Norway
3	Algeria	40	Hongkong	77	Oman
4	Argentina	41	Hungary	78	Pakistan
5	Armenia	42	Iceland	79	Panama
6	Australia	43	Indonesia	80	Peru
7	Austria	44	Iran	81	Poland
8	Azerbaijan	45	Iraq*	82	Portugal
9	Bahrain	46	Ireland	83	Qatar
10	Bangladesh	47	Israel	84	Republic of Korea
11	Belarus	48	Italy	85	Republic of Slovak
12	Belgiam	49	Japan	86	Rumenia
13	Bolevia	50	Jordan	87	Russia
14	Bosnia Herz	51	Kazakhastan	88	Saipan
15	Brazil	52	Kenya	89	Saudi Arabia
16	Brunei	53	Kosovo	90	Singapore
17	Bulgaria	54	Kuwait	91	Slovenia
18	Canada	55	Laos PDR	92	South Africa
19	Chile	56	Latvia	93	Spain
20	China	57	Lebanon	94	Sri Lanka
21	Columbia	58	Libya*	95	Sweden
22	Combodia	59	Luxzemburg	96	Switzerland
23	Congo	60	Macau	97	Sychelese
24	Costarica	61	Malaysia	98	Tanzania
25	Crotia	62	Maldives	99	Thailand
26	Cuba	63	Malta	100	The Philippines
27	Cyprus	64	Mecedonia	101	Tunetia
28	Czech Republic	65	Mexico	102	Turkey
29	Denmark	66	Moldova	103	Uganda
30	Egypt	67	Mongolia	104	Ukrain
31	Estonia	68	Moritius	105	United Arab Emirates
32	Fiji	69	Morocco	106	United States of America
33	Finland	70	Mozambique	107	Uzbekistan
34	France	71	Myanmar	108	Venezuala
35	Germany	72	Netherland	109	Vietnam
36	Great Britain	73	New Zealand	110	Zambia
37	Greece	74	Nicaragua		

*Currently restricted country

1.3.6 History of Emigration in Nepal

Nepal has a long history (more than 200 years) of emigration and it is an increasing trend. The history of formal Labour migration begins in 1814-1816, after the Nepal-British India war. A total of 4,650 Nepalese youngsters were recruited to the British armed forces as a British Gurkha regiment after the conclusion of the war and the signing of the Treaty of Sugauli in 1816. (7)

Similarly, the migration of Nepalese people for other employment purposes, such as working in the tea estates of Darjeeling and the forest of Assam, India, began in the second half of the 19th century. Economic

migration to the Middle East from South Asia and other parts of the world was spurred on by the oil boom in the early 1970s. International labour migration, mostly to the Gulf States, Malaysia and other South East Asian countries is a new phenomenon of migration in the Nepali context with about 30 years of history. Unexpectedly, foreign labour migration has developed in such a way that it has shifted the agricultural-based Nepali economy towards a remittance-based economy. (7)

1.3.7 Labour export policy and legislation

Nepal has a significant history of labour migration, primarily to countries in the Middle East, Southeast Asia, and parts of Europe. The government of Nepal has established policies and legislation to regulate this migration and protect the rights of Nepali workers abroad. Here are some key points regarding labour export policy and legislation in Nepal: The country has a Labour Migration Act that governs the process of Labour migration from Nepal to foreign countries. This act outlines the procedures, requirements, and regulations that both the recruiting agencies and the workers need to follow. At present, the country's Labour Act 1992 and Labour Rules 1993 neither adequately address current OHS problems faced by industrial workers nor sufficiently provide any standard procedure or system to ensure their good health and safety at workplaces. (8)

Table 2: Policies and regulations

Policies and regulations	Findings
Constitution of Nepal	The constitution of Nepal was promulgated in 2015. Although the constitution does not speak outrightly on directives related to Occupational Health and Safety, nevertheless, it provides fundamental premises for attaining, ensuring, and establishing the highest level of health and safety practices.
Labour Act 2017	The current Labour Act has a mandatory provision of coverage of at least NPR one hundred thousand per year for every worker as part of the medical treatment cost. Similarly, the Act demands coverage of at least NPR seven hundred thousand for every worker as workplace injuries-related treatment cost. The Act specifies that the premium for medical insurance will be paid half by the employer and half by the employee, however, the Act requires the premium for accident insurance to be fully borne by the employer
Public Health Service Act 2018	Clause 44 of this Act speaks on the safety of the health workers in risky zones and encourages them to adopt safety measures. the provision of risk allowance to the workers and in case of serious infection, injury or death, necessary compensation has also been recommended.
15th Strategic Development Plan (2019/2020- 2023/2024)	setting up and implementation of occupational safety and health standards in enterprises to provide dignified employment opportunities to the workers in the country
Labour Rule, 2018	The rule encourages for development of an Occupational Safety and Health Policy for each workplace with the inclusion of a safety preparedness plan, worker's health, machine operation, use of hazardous substances, etc.
National Health Policy Nepal, 2019	To ensure the constitutional rights of citizens to health services through a federal health system and ensure universal access to the health policy. However, does not mention occupational safety and health.

There are no province-level Regulations related to occupational safety and health to date in Nepal. The Labour Act, 2017 and Labour Rules, 2018 which include provisions for occupational safety and health are federal government legislation. Provisions of occupational safety and health directed in the Labour Act, 2017 and its Rules, 2018 apply to all workplaces of seven provinces of Nepal but the provision of safety and health committee mentioned in section 74 of the Act and rule 37 of the Regulation is only applicable in the enterprises employing 20 or more employees.

Findings:

- The laws and regulations do not specify
- Pre-entry screening and post-entry screening for health. However, mentions the establishment of a primary health clinic for first aid management.
- It mentions the rights and duties of the labour migrants and returnees and their health.

1.3.8 Key stakeholders in Labour migration

In the context of labour migration in Nepal, several key stakeholders play significant roles in various aspects of the migration process. These stakeholders include:

Government of Nepal: The government plays a central role in formulating policies, regulations, and laws related to labour migration. It oversees the licensing and regulation of recruitment agencies, provides pre-departure orientation for migrant workers, negotiates bilateral agreements with destination countries, and establishes mechanisms for the protection of migrant workers' rights.

Department of Foreign Employment (DoFE): The DoFE is the government body responsible for regulating and overseeing foreign employment in Nepal. It issues licenses to recruitment agencies, monitors their activities to ensure compliance with the law, provides support services to migrant workers, and facilitates their safe migration.

Ministry of Labour, Employment, and Social Security: This ministry is responsible for formulating labour policies, promoting decent work opportunities, and ensuring the protection of workers' rights, including those of migrant workers. It works closely with other government agencies and international organizations to address issues related to labour migration.

Recruitment Agencies: Recruitment agencies play a crucial role in facilitating labour migration by connecting Nepali workers with employment opportunities abroad. They assist workers in obtaining necessary documentation, provide pre-departure orientation and training, and coordinate with employers and authorities in destination countries.

Migrant Workers: Migrant workers themselves are key stakeholders in labour migration. They seek employment opportunities abroad to improve their economic prospects and support their families back home. Migrant workers rely on recruitment agencies, government services, and support networks to navigate the migration process safely and successfully.

Employers in Destination Countries: Employers in destination countries hire Nepali migrant workers to meet their labour needs in various sectors such as construction, manufacturing, hospitality, and domestic work. They are responsible for providing safe working conditions, fair wages, and other benefits to migrant workers following local laws and regulations.

Civil Society Organizations (CSOs): CSOs play an important role in advocating for the rights of migrant workers, raising awareness about migration-related issues, providing support services to migrant workers and their families, and holding governments and other stakeholders accountable for their actions or lack thereof in protecting migrant workers' rights.

International Organizations and Donor Agencies: International organizations such as the International Labour Organization (ILO), United Nations agencies, and donor agencies provide technical assistance, capacity building, and funding support to Nepal in areas related to labour migration, including policy development, data collection, research, and implementation of programs to promote safe and orderly migration and protect migrant workers' rights.

2. Healthcare System of Nepal

Nepal's health system is distinguished by a comprehensive and inclusive approach that incorporates accessibility, quality assurance, and responsiveness to emerging health challenges. The ongoing commitment to UHC and alignment with global development goals positions Nepal's healthcare system on a trajectory of continuous improvement and resilience. Health service delivery systems in Nepal encompass Allopathic, Ayurvedic, Homeopathic, Unani, Naturopathy, Amchi, Acupuncture/Acupressure, Yoga and other indigenous practices, with a mix of both public and private sectors. The health system underwent and is in continuous restructuring at the federal, provincial, and LLGs, levels adapting to exercise authority and fulfil constitutional mandates at each level of government. At the federal level, five divisions (Policy, Planning and Monitoring Division, Health Coordination Division, Quality Standards and Regulation Division, Population Management Division) and HEOC unit operating under the MoHP, are responsible for managing the policy framework, planning, setting standards, coordination, monitoring, and supervision. Immediate implementation and further planning are conducted through departments- DoHS, the Department of Ayurveda and Alternative Medicine (DoAA), and the Department of Drug Administration (DDA). These departments, through their respective deconcentrated entities viz divisions, centres, and Laboratories, guide their provincial counterparts under the provincial ministries, which in turn support health offices at the district and health coordination units at the Local level of government (LLGs). Public institutions, including Basic health service units/centres and hospitals at the LLGs, primary and secondary hospitals at the provincial level, and tertiary, super-specialized, and academia/teaching hospitals at the federal level, are mandated to deliver health services. The structure encompasses both allopathic, Ayurvedic and alternative medicine health service provisions, extending beyond curative aspects to include promotive, preventive, rehabilitative and palliative dimensions. Furthermore, private health facilities operate at all levels, complementing public institutions. Each institution is mandated to allocate 10% of free beds for impoverished citizens to access health facilities as needed. Moreover, there is an expansion of the health insurance program to cover services beyond basic health services, aiming to reduce out-of-pocket (OOP) expenses and protect against catastrophic health expenditures. This comprehensive network, inclusive of academia/teaching hospitals and super-specialized hospitals at the federal level, contributes to the holistic and community-centric nature of Nepal's health service delivery. (9)

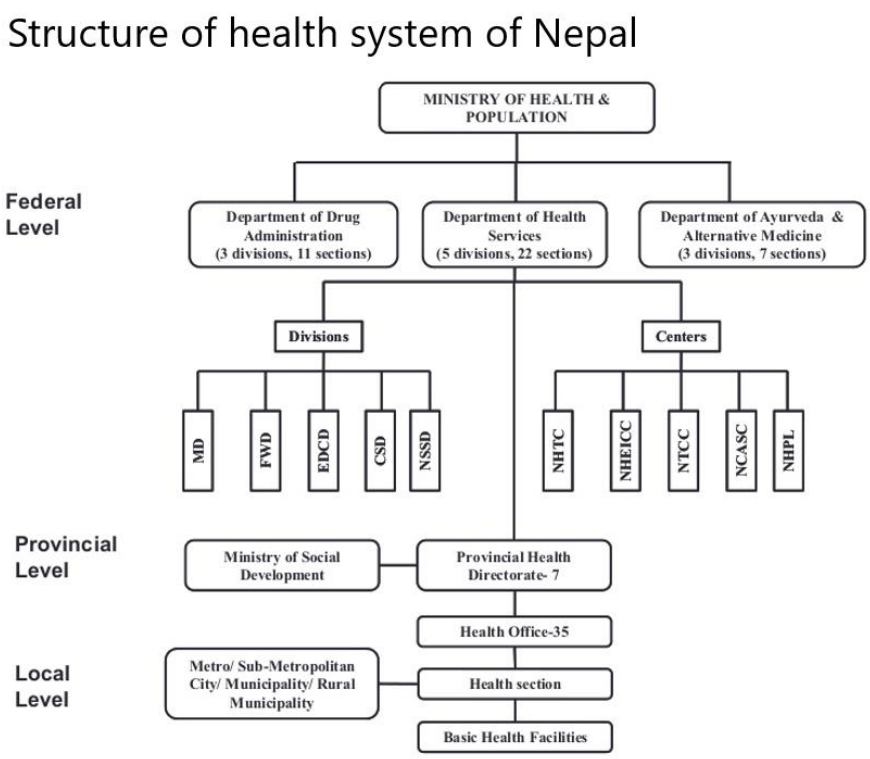

Figure: 3 Structure Health care system of Nepal

2.1 Healthcare Setting

2.1.1 Public Sector

Nepal's pluralistic health system comprises public services and the private sector (including profit and non-profit organizations). The national health system is of three-tier systems i.e. federal, provincial and local levels. At the federal level, under the Ministry of Health and Population, there is a Department of Health Services. Under the Department of Health Services, there are 5 divisions and 22 sections. Its major role is in policy formation, technical backstopping and resource allocation.

The Provincial Health Directorates provide technical backstopping and programme monitoring to district health systems and come directly under the Ministry of Social Development of the Province. The regional, sub-regional, and district hospitals are categorized into three levels of hospitals; Primary, Secondary and Tertiary. There are also training centres, Laboratories, TB centres and medical stores at the provincial level.

The public healthcare system was restructured into local, provincial and state-run facilities in 2015 with Primary Health Care Centres (PHC), Basic Health Centers and Health Posts as basic units for health service delivery. The health post (from an institutional perspective) is the first contact point for basic health services. Besides, the health post is the referral centre of the volunteer cadres of FCHVs as well as a venue for community-based activities such as PHC outreach clinics and EPI clinics. Each level above the HP is a referral point in a network from HP to PHCC, on to district zonal and regional hospitals, and finally to speciality tertiary care centres in Kathmandu. This referral hierarchy has been designed to ensure that the majority of the population receives public health and minor treatment in places accessible to them and at a

price they can afford. Inversely, the system works as a supporting mechanism for lower levels by providing logistical, financial, supervisory, and technical support from the centre to the periphery

2.1.2 Private Sector

Private health service providers are mostly located in urban areas and are used predominantly by wealthier Nepalese patients. In rural areas—where public facilities are accessed more than in urban areas (with a utilisation rate of 39.1% and 26.8%, respectively) but are still not the predominant provider—pharmacies are the chief private providers, mostly used by poor patients. People use private facilities more frequently than public ones—one study found that about 63% of people with an acute illness used the private sector regardless of their economic status. As a result, out-of-pocket spending is high (out-of-pocket payments account for 55% of total health expenditure) and financial protection for patients is poor. Consequently, poor patients utilise health services less than wealthier patient groups, despite having a higher incidence of reported illness. (10)

2.2 Health Facilities

The Ministry of Health is in charge of provincial, district, and commune health facilities and is in charge of developing and implementing health care services at the appropriate level. Numerous health facilities are under the management of the Ministry of Health, including research and Pasteur institutes, universities, colleges, and national hospitals. Every province has a minimum of one provincial hospital, which serves as a support system for national hospitals throughout all stages of care. Basic care, emergency services, and common disease treatment are provided at the district level. Lastly, basic care, health education, and awareness programs are provided at the community level.

Table 1: Number of health facilities

Facility	**Number**
Public hospitals	215
Primary Health Centres	187
Health Posts	3778
Non-public facilities	2551
Basic Health Services Centre	7582
Basic Hospital (5-15 beds)	246
General Hospitals (25-50 beds)	333
General Hospitals (100-300 beds)	79
Specialized hospitals (100 beds and above)	28
Super Specialty Hospitals (50+ Beds)	22
Academic and teaching hospitals (300+beds)	29
Other Types of Health Facilities	2164

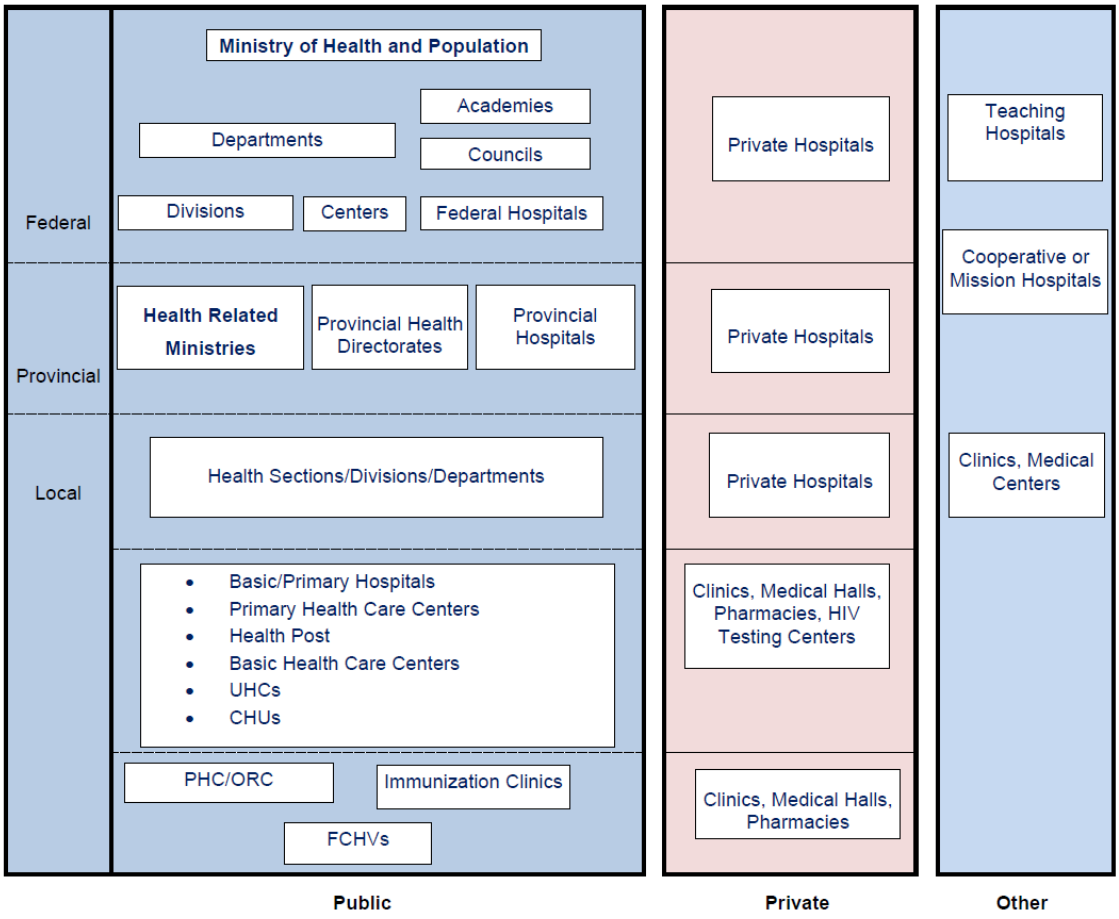

Figure: 4 Organisational chart of Nepal healthcare system, illustrating roles and responsibilities of each component

2.3. Health Finance

The Nepal Constitution included provisions for four types of grants: equalization grants, conditional grants, matching grants, and special grants. The variables used for fiscal equalization grants are population, level of development, and cost-adjusted local government area. Based on the constitutional provisions, the government promulgated two acts related to intergovernmental fiscal transfers (IGFTs) in 2017: the Intergovernmental Fiscal Management Act (IGFMA) and the National Natural Resource and Fiscal Commission Act. Article 6.1 of IGFMA Schedule 3 established the federal divisible fund (FDF) to divide the value-added tax and excise duty on domestic production among the federal, provincial, and local governments. Furthermore, as one of its provisions, Subarticle 2 divided the total amount of the FDF, allocating 70% to the federal government, 15% to provincial governments, and another 15% to local governments. The IGFMA also provides guidelines regarding different types of grants. The most crucial part of an IGFT is the impact on governmental policy objectives, which depends on the formulation of the transfer system and the operational portion of the transfer fund. IGFTs are contingent on the transfer mechanism and the effects of fiscal transfers on basic outcomes such as allocative efficiency, equitable distribution, and macroeconomic stabilization.

The first federal budget was allocated in fiscal year 2017–2018, with fiscal equalization grants and special grants delivered to the local level. Similarly, the IGFMA provided for general revenue sharing and natural resource revenue sharing modalities among the different tiers of government. In 2019, the total health

expenditure per capita in Nepal was US$53.3 Overall, health expenditures represented 4% of the country's gross domestic product (GDP), well below the global average of 10%. Healthcare financing in Nepal involves three principal sources: governmental funding, external contributions, and private expenditures. Government spending accounted for 25% and external contributions represented 16% of Nepal's total health expenditures in 2019. Out-of-pocket spending on health care constituted nearly 58% of all health expenditures.

Governmental spending on health has been increasing in Nepal, but the health sector still receives only a modest share of general spending (4%). Although budgeting processes have been shifting as a result of the transition from a unitary to a decentralized federal system of governance, governmental health allocations and expenditures continue to be concentrated at the central level, focusing on developing health infrastructure, procuring drugs and vaccines and medical equipment, and recently on the COVID-19 response. In the fiscal year 2021–2022, 74% of the health budget was allocated to the central level, 5% to the provincial level, and 21% to the local level.

2.4. Health Information Technology

All health facilities/programs bear the responsibility of documenting and reporting program/ service statistics through standardized platforms for Management Information Systems (MIS). These platforms include Health Management Information System (HMIS), Logistics Management Information System (LMIS/electronic LMIS (eLMIS), Financial Management Information System (FMIS), Health Infrastructure Information System (HIIS), Planning and Management of Assets in Health Care System (PLAMAHS), Human Resource Information System (HuRIS), Training Information Management System (TIMS), Ayurveda Health Management Information System (AHMIS), Early warning and Reporting System(EWARS), Malaria Disease Information System (MDIS) and the Drug Information Network (DIN). Additionally, these facilities contribute data to various health surveillance systems, such as disease surveillance, vital registration, censuses, sentinel reporting, surveys, rapid assessments, and research initiatives. DoHS takes the lead in managing information systems except for DIN and AHMIS, which are overseen by the DDA and DoAA respectively. (9)

2.5 Health Quality Control

2.5.1. Hospital quality management.

A Policy on Quality Assurance in Health Care Services 2007 was prepared by the MoHP to provide guidelines for the integration of quality-of-care components in health, to ensure that a quality assurance system is in place, and to ensure overall quality improvement activities are well implemented in all health facilities to fulfil consumers' needs. This Quality control of health services in Nepal involves various strategies and mechanisms aimed at ensuring that healthcare provided to the population meets certain standards of safety, effectiveness, and patient satisfaction. Here are some key aspects of quality control in health services in Nepal. (11)

Regulatory Framework: Nepal has regulatory bodies such as the Ministry of Health and Population (MoHP) and the Nepal Health Professional Council (NHPC) responsible for setting and enforcing standards for healthcare providers, facilities, and services.

Accreditation: Accreditation programs evaluate healthcare facilities and providers against established standards to ensure quality of care. In Nepal, the Quality Assurance and Accreditation Section (QAAS) under MoHP oversees accreditation processes.

Training and Education: Continuous training and education programs for healthcare professionals are crucial for maintaining and improving quality standards. This includes ongoing medical education, skills development, and training on patient safety protocols.

Monitoring and Evaluation: Regular monitoring and evaluation of healthcare services help identify areas for improvement and ensure compliance with standards. This can involve routine inspections, audits, and assessments of healthcare facilities and providers.

Patient Feedback Mechanisms: Collecting feedback from patients about their experiences with healthcare services is essential for assessing quality and identifying areas for improvement. Patient satisfaction surveys and complaint mechanisms can help healthcare providers address issues and enhance patient-centred care.

Clinical Guidelines and Protocols: Implementing evidence-based clinical guidelines and protocols helps standardize care delivery and improve clinical outcomes. Health facilities in Nepal often adopt guidelines developed by international organizations like the World Health Organization (WHO) and adapt them to local contexts.

Technology and Information Systems: Utilizing technology and information systems can improve the quality and efficiency of healthcare delivery. Electronic health records (EHRs), telemedicine, and health information systems enable better coordination of care, patient monitoring, and data-driven decision-making.

Community Engagement: Engaging communities in healthcare decision-making and service delivery processes fosters accountability and responsiveness to local needs. Community health programs and participatory approaches can enhance access to quality healthcare in remote areas.

Public Health Initiatives: Addressing broader public health challenges such as infectious disease control, maternal and child health, and non-communicable disease prevention contributes to overall healthcare quality and population health outcomes.

Capacity Building: Strengthening the capacity of healthcare systems, including infrastructure, human resources, and supply chains, is essential for delivering quality health services. This involves investments in training, equipment, facilities, and logistics management.

Table 2: Key roles and responsibilities for quality assurance

Authority	**Key roles and responsibilities for Quality Assurance**	**Monitoring Mechanisms**
a. Federal Level		
MoHP (Quality Assurance and Regulation Division)	Preparing, reviewing, and facilitating the implication of national quality assurance policies and guidelines Establishing service standards and monitoring for all services and types of facilities Guidance and monitoring of the quality of services being delivered by all types of health facilities Review and monitoring of service provision and quality of services delivered Establishing quality standards for drugs, commodities, equipment, and medical supplies	National Quality Assurance Committees Periodic Health Sector Review Meetings

	Ensuring requirements as per the International Health Regulation (IHR) Facilitating registration, renewal, and monitoring of health facilities based on their established criteria and norms	
DoHS	Facilitating implementation, monitoring, and review of the delivery of health services and quality of those services Supporting MoHP in preparation of quality-of-care related policies, protocols, and guidelines of MoHP Ensuring delivery of essential services by all basic health care facilities and other services as per the protocol and health policies	Quality Assurance and Monitoring Committee
Divisions/ Centers	Developing program-specific technical guidance and protocols to ensure preparedness and delivery of health services	Technical Working Groups with the assigned role of quality assurance
b. Province Level		
MoSD/MoHP	Prepare and implement provincial policies, acts, quality standards, and implementation guidelines Ensure delivery of essential services by all facilities and other services as per the policy and protocols Facilitate registration, operation, listing, and regulation of private and cooperative health facilities as per the policy and protocols Facilitate production, and use of health-related commodities, and medicines and ensure the quality of imported medicines and commodities	Provincial Quality Assurance Committees
Directorate/ Centers	Management of logistics and supply chain system of medicines, health commodities, and supplies Facilitate implementation, monitoring, and review of the delivery of health services and the quality of those services by provincial-level health facilities Facilitate dissemination and implementation of program- specific technical guidance and protocols	Technical Working Groups
Health Offices (district level)	Coordinate with the municipal, district, and provincial level authorities to ensure delivery of health services as per the policy and protocol	Technical Committees (if necessary)
c. Local Level		
Municipality	Ensure delivery of basic health and sanitation services as per the federal, provincial, and local health policies, standards, and protocols Facilitate dissemination of information for public awareness and demand creation	Municipal Health Committees

	Coordinate with other sections/sectors to create clean, healthy, and resilient societies	
Hospital/Health Facility	Deliver basic health services as outlined in federal, provincial, and local health policies and by ensuring national standards and protocols	Health Facility Operation and Management Committee with a mandate to review the quality of health services

Minimum Service Standards (MSS) for hospitals are the service readiness and availability of tools for optimal requirements of the hospitals to provide minimum services that are expected from them. This tool entails for preparation of service provision and elements of service utilization that are deterministic towards the functionality of the hospital to enable a working environment for providers and provide resources for quality health service provision. MSS for hospitals reflect the optimally needed minimum criteria for services to be provided but in itself is not an "ideal" list of the maximum standards. This checklist of MSS is different from a program-specific quality improvement tool as it will outline the equipment, supplies, furniture, and human resources required for carrying out service but not detail the standards and operating procedures of any service. The results of the Nepal Health Facility Survey 2015 showed that among the health facilities that were assessed only 13 % of them had all seven basic equipment items- adult weighing scale, child weighing scale, infant weighing scale, thermometer, stethoscope, blood pressure apparatus and a light source for service provision. The availability of all supplies and equipment defined for standard precaution control was as low as 0.2%, all basic Laboratory services in 12% and only 3% of facilities had client feedback mechanisms in place. This was an alarming situation. During that period, minimum service standards were rolled out in 83 district-level hospitals and were evident to contribute to the quality of services provided by hospitals with instances of improved governance, management, clinical and support services. This encouraged MoHP to put its efforts into setting the minimum service standards for hospitals at secondary and tertiary levels and at the same time contextual revision of MSS for district hospitals to set MSS for primary level hospitals. The revision and development of the tool took into series of steps beginning with the formulation of a Technical Working Group and selection of subject experts and technical coordinators and consultative workshops and meetings. The key guiding documents are the Constitution of Nepal 2015, National Health Policy 2014, Policy on Quality Assurance in Health Care Services, 2007, Public Health Service Act 2015, Nepal Integrated Health Infrastructure Development Standards 2016, Nepal Health Sector Strategy 2015- 2020 and Guideline on Health Institution Establishment, Operation and Upgrading Standards, 2070 but not limited to them. (12)

2.6 Certification of Health Practitioner

Nepal Health Professional Council (NHPC) is an autonomous body established under the Nepal Health Professional Council Act 1996. This council aims to register all the "Health professionals" other than medical doctors, Nurses, Pharmacists, and Ayurveda according to their qualifications; and bring them into a legal system to make their services effective with quality and timely in a scientific manner.

The Nepal Medical Council (NMC) is the government authority established as per the NMC Act to conduct various activities, including the registration of medical doctors in Nepal. The primary role of the council is to assure and promote quality in the medical profession to protect the health care seekers, foster ethical conduct and develop and maintain high academic and professional standards.

Nepal Nursing Council (NNC) was established under the Nepal Nursing Council Act 1996 and came into force on 16 June 1996. The first amendment of the act was done on 17th January 2002 A.D.

The power, function and duties of these councils shall be as follows: -

- To formulate the policy required to operate the profession smoothly
- To provide recognition to a teaching institution,
- To evaluate and review the curriculum, terms and conditions of admission, examination system and other necessary terms and conditions and infrastructure of a teaching institution

- If a teaching institution is found from the evaluation and review made according to clause (c) to have failed to meet the standards determined by the council, to make a recommendation for revoking the approval for operation of such institution.
- To determine the qualifications of the health professionals and to issue certification to the qualified health professional after registering his /her name in the registration book,
- To determine the work limit of health professionals,
- To formulate a professional code of conduct for health professionals and to take action against those health professionals who violate such code of conduct.

3. National occupational safety and health profile of Nepal

Occupational health is an area of work in public health to promote and maintain the highest degree of physical, mental and social well-being of workers in all occupations. The science and practice of occupational health involve several disciplines, such as occupational medicine, nursing, ergonomics, psychology, hygiene, safety and others. Occupational safety and health (OSH) are crucial for ensuring workplace efficiency and productivity. Emerging occupational health problems are to be tackled along with the existing public health problems like communicable and non-communicable diseases. However, the epidemiological profile and analysis of occupation exposure and disease are few and far between, which is limited to some major injuries and deaths. Often, these injuries and deaths are not reported to the national system due to weak monitoring and evaluation systems, especially in countries like Nepal.

3.1 Authority or Body, Responsible for Occupational Safety and Health

The Ministry of Labour, Employment, and Social Security is the apex body for national Occupational Safety & Health (OSH) supervision and administration in Nepal. There are four divisions in the Ministry of Labour, Employment, and Social Security. The joint secretary is the chief of each division. According to the job description of the Child Labour and Occupational Safety and Health section, functions related to OSH are given to this section. The Undersecretary technical (Mechanical Engineer) is the chief of this section. There is one factory inspector (Mechanical Engineer) and one section officer in this section. There are only three staff (including the undersecretary) posted in this section. According to the job description of this section, Child labour-related works are also assigned to this section. This section is responsible for OSH-related works in additional to a broader set of works related to labour management. The main enforcement body at the local levels and the specified areas are the Labour and Employment offices. The major activities carried out by these offices are monitoring the labour relations occupational safety and other health aspects in the establishment and enterprises as specified under the legislation. The Labour and Employment Offices at the local levels are headed either by the Labour Officer or the Factory inspector. The other staff members to support the activities of these offices are the non-gazetted officers and the assistants. OSH seems a less priority area for the Ministry of Labour, Employment, and Social Security. Due to lack of priority, the institutional structure for OSH Supervision and Administration seems weak with a severe lack of human resources and includes only 3 staff (joint secretary 1, undersecretary technical 1, and factory inspector 1) responsible for OSH Supervision and Administration.

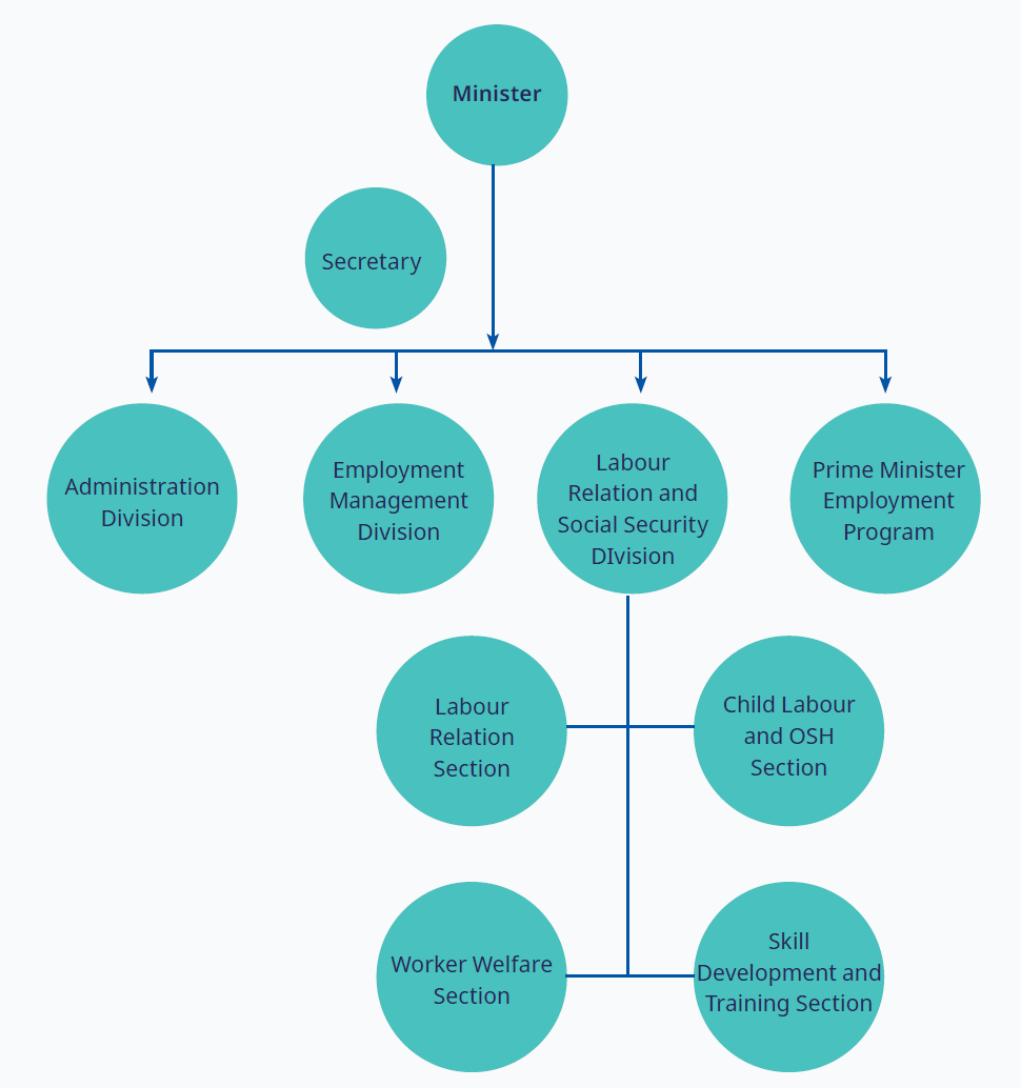

Figure: 1 Occupational Safety and Health Organization in Nepal

Table 3: List of universities and other academic institutions related to OSH

Institutions	**Affiliations**	**Courses**	**Thesis on Occupational Health and Safety**
1. Kathmandu University School of Medical Sciences	Kathmandu University	MD Community Medicine MSc in Public Health	Yes
2. Manipal College of Medical Sciences	Kathmandu University	MD Community Medicine	Yes
3. College of Medical Sciences, Bharatpur	Kathmandu University	MD Community Medicine	Not done till now

4. Kathmandu Medical College, Kathmandu	Kathmandu University	MD Community Medicine	Yes
5. Nepal Medical College, Kathmandu	Kathmandu University	MD Community Medicine	Not done till now
6. Nepalgunj Medical College, Nepalgunj	Kathmandu University	MD Community Medicine	Not done till now
7. Nobel Medical College, Biratnagar	Kathmandu University	MD Community Medicine	Not done till now
8. Lumbini Medical College	Kathmandu University	MD Community Medicine	Not done till now
9. BP Koirala Institute of Health Sciences, Dharan	BPKIHS	MD Community Medicine	Yes
		Masters in Public Health	
10. Institute of Medicine, Kathmandu	Tribhuvan University	Masters in Public Health	Yes
11. KIST Medical College	Tribhuvan University	Masters in Public Health	Not done till now
12. Universal College of Medical Sciences, Bhairahawa	Tribhuvan University	Masters in Public Health	Not done till now
13. Chitwan Medical College, Bharatpur	Tribhuvan University	Masters in Public Health	Not done till now
14. Gandaki Medical College, Pokhara	Tribhuvan University	Masters in Public Health	Not done till now
15. Manmohan Medical Institute of Health Sciences, Kathmandu	Tribhuvan University	Masters in Public Health	Not done till now
16. Patan Academy of Health Sciences, Lalitpur	PAHS	Masters in Public Health	Not done till now
17. School of Health and Allied Sciences, Kaski	Pokhara University	MPH (Public Health and Services Management)	Not done till now
		MPH (Health Promotion and Education)	
		Promotion and Education)	
18. Nobel College, Kathmandu	Pokhara University	MPH (Public Health and Services Management)	Not done till now
		MPH (Health Promotion and Education)	
19. Himalayan Institute of Science and Technology, Kathmandu	Purbanchal University	M.Sc. (Engineering Management)	Done
20. Nepal Engineering College, Centre for Post Graduate Studies, Lalitpur	Pokhara University	M.Sc. (Construction Management)	Done
21. Central Department of Environmental Science	Tribhuvan University	PhD in Occupational and Environmental (Road Safety)	Done

		M.Sc. Environment Science (OHS management Course)	
		M.Sc. Environmental	
		Health in Disaster	

(13)

3.2 Mechanisms for ensuring compliance including the systems of inspection

The Labour Act 2017 in its section 12 relates to occupational safety and health provisions and the provisions are stated in clauses 68 to 83. The Act defines the roles responsibilities and procedures for the factory inspection. Structure and Activities of Labour and Employment Office (LEO) on OSH The first labour office in Nepal was established in 1970 at Biratnagar under the then Department of Industry. With the formation of the Department of Labour in 1981 under the ministry of labour and social welfare, there were very few labour offices and the number simultaneously increased to ten labour offices throughout the country by 1990. The current offices have been named as Labour and Employment Office (LEO) since 2017 with the revised organizational structure. The number of staff at the Labour office has been increasing as they also need to work along with the issuance of foreign employment permits. Labour and employment offices are working to protect employees' rights by settling individual complaints filed by the worker as per the Labour Act 2017 and participatory collective bargaining. Labour and Employment Offices aim to ensure justice, promote OSH and foster harmony between workers and employers for good industrial relations towards sustainable industrial growth in the country. LEOs are responsible for factory inspection to ensure that enterprises comply with the OSH provisions stated by the Labour Act 2017 and Labour regulations. LEOs are also responsible for labour inspection to ensure the types of employment and employment contracts, guaranties of stated minimum wages, and social security provisions such as provident funds, gratuity, and insurance to the workers. LEOs and their factory inspectors are also liable to ensure appropriate Occupational Safety and Health conditions for the workers to protect from work-related hazards and risks on their constraining resources provided. Also, LEOs are assigned to register enterprise-level trade unions and conduct their union election to ensure workers enjoy the right of freedom of association and the right for collective bargaining. The LEOs are also responsible for acting on the assignment and activities stated.

3.3 Occupational health services including industrial hygiene

The Occupational Safety and Health Center used to provide industrial hygiene services such as measuring light, noise, sound, and dust in the factories based on their annual work plan. However, now due to the lack of adequate equipment and human resources, the service is currently outsourced. The basic Occupational Safety and Health Services include the following major criteria:

1. Surveillance of work environment and risk assessment.
2. Health surveillance and health examinations.
3. Advice on preventive and control measures.
4. Health education, health promotion, and promotion of workability.
5. Maintaining preparedness for first aid and participation in emergency preparedness.
6. Diagnosis of occupational diseases.
7. Record keeping

The Labour Act 2017 of Nepal ensures the provision of first aid in industrial enterprises with more than 50 employees and the requirements of an academically trained medical assistant in the case of industrial enterprises with more than 400 workers. If an industrial enterprise has more than 1,000 employees, a medical doctor and a medical assistant are required. Many registered health centres in Nepal provide health care services including Occupational Health Services to the employees of different workplaces under a memorandum of understanding between those institutions. However, their services are limited to the

diagnosis and treatment of the diseases of the workers. Some of the institutions like BPKIHS have established the Department of Environment and Occupational Health under the School of Community Medicine which provides health screening program in some of the industries in the Dharan, Biratnagar Industrial Corridor. Though Nepal is a signatory to the UN High-Level Meeting political declaration on Universal Health Coverage, there is no provision yet for the standard occupational health services in the industries and enterprises in Nepal.

3.4 List of occupational health service providers and their service contents

To date, there are no specialized health service providers in Nepal offering their targeted services related to Occupational Safety and Health. Although, the Occupational Safety and Health Center is the apex body for providing these basic occupational health services among other services, currently lacks trained human resources and advanced monitoring equipment. The Center has not been rendering these services currently, But a few private institutions are known to provide fragmented occupational health services such as health screening, diagnosis, workplace monitoring, etc

3.5 Certification for Occupational Health Practitioners

There are no medical schools that specialize in occupational health in the country. There is no certification system for occupational health practitioners. However, different universities, autonomous institutions and affiliated colleges provide courses suchas MPH/ MD Community Medicine /MSc/ ME where student conducts thesis work onoccupational health and safety-related topics

3.6 Provision of OSH training

Occupational Safety and Health Project (OSHP), Bhaisepati, since its inception in 1995 under the Ministry of Labour and Transport Management, has been conducting various types of capacity-building training programs in the field of occupational safety and health. OSHC by now, since its establishment, has provided training at the centre and provincial level and or factory site for more than 11 thousand workers, employees, and government officers. Each year, under the annual program and activities, this project conducts the following training program. The course contents and structure for the training are listed as under: a) Advanced training on OSH for 14 days. b) Boiler Safety and Operation Management for 14 days and 7 days modules. c) 4 days of training on OSH. d) 4 days of training on OSH for government employers. e) Hazard analysis and risk assessment training. f) Basic awareness training on OSH. g) Training material, poster, and leaflet development. h) OSH awareness program and seminar in each province or region. i) OSH awareness sector-specific programs.

3.7 Non-Governmental OSH Organization

There are few Non-Governmental OSH Organizations in Nepal. The Occupational Health and Safety Society of Nepal is a society of researchers and professionals in the field of OHS in Nepal. The society publishes the International Journal of Occupational Safety and Health (IJOSH) since 2011. IJOSH is an international peer-reviewed, indexed, open-access journal covering occupational health and safety-related disciplines. IJOSH is published half-yearly. It provides occupational health physicians, doctors, nurses, engineers, ergonomists, and a wide range of occupational hygiene, health and safety professionals with a dependable single source of proficiently written legal, practical and management occupational health information. Occupational Safety and Health Professionals Nepal is a national organization of OHS professionals in Nepal. Its core objectives are to promote occupational health and safety in workplaces in Nepal and to form a learning, sharing and networking platform for OSH Development in Nepal. It also promotes the sharing of ideas, opinions, knowledge, skills, various issues, experiences, and relevant information in the field of OSH.

3.8 Mechanism for the collection and analysis of data on occupational injuries and diseases and their causes

The Labour and Employment Offices (LEO) are entitled to collect and analyze data on occupational injuries, diseases, and their causes. The data gap majorly exists due to poor monitoring and supervision of the factory inspectors and lack of adequate accident recording and reporting systems. As per the Labour Act 2017, the employers are responsible for reporting the occurrence of any accident in their enterprises to the respective Labour and Employment Office and also informing employees at their enterprise. The Labour and Employment Office is obliged to make further investigations of the incident. However, the reporting of such incidents is very limited on the employer's part. It is known that most of the cases of an accident are negotiated and solved and negotiated within the industrial premises and never reported. The major causes for diseases and accidents at the workplace reported by earlier research identify violation of safety rules, congested workplaces, unsecured workplaces, carrying a heavy load, lack of awareness among workers, carelessness of both the workers and management, unsecured/old machines or equipment, poor layout, unavailability of the safety equipment/tools as necessary, low standard tools, unsuitable working conditions and use of low-quality raw materials. (14) Likewise, lack of training, lack of inspection, supervision, and monitoring, resource constraints (human and financial), and oversight of facilities are also important factors responsible for the high incidence of disease and accidents in Nepal. (15)

3.9 Number of occupational injuries and diseases covered by social security schemes

In 2017 a new Labor Act was enacted. The Act added some important provisions on occupational diseases. After the enactment of the Labour Act 2017, the Labor Regulations, 2018 and the Occupational Safety and Health Policy, 2019 were also enacted. The regulations made detailed arrangements for occupational diseases. It included in the regulations that the list of occupational diseases needs to be published in the Gazette. However, the government has not yet classified the occupational diseases and published the list in the Gazette, but instead published it in the “Social Security Scheme Operation Procedure, 2018”. While preparing the “Social Security Scheme Operation Procedure, 2018” the OSH expert who is responsible for this National OSH profile suggested to the Government of Nepal that in the absence of Nepal’s list of occupational diseases, it would be wise to implement the ILO list of the occupational diseases. The Government of Nepal agreed to this suggestion and endorsed the ILO list of occupational diseases as Nepal’s list of occupational diseases. The procedure states that in the event of an illness or accident, while working, the company or the organization should protect such a person.

3.10 List of Occupational Diseases

1. Occupational diseases are caused by exposure to agents arising from work activities.

1.1. Diseases caused by chemical agents.

1.1.1. Diseases caused by beryllium or its compounds.

1.1.2. Diseases caused by cadmium or its compounds.

1.1.3. Diseases caused by phosphorus or its compounds.

1.1.4. Diseases caused by chromium or its compounds.

1.1.5. Diseases caused by manganese or its compounds.

1.1.6. Diseases caused by arsenic or its compounds.

1.1.7. Diseases caused by mercury or its compounds.

1.1.8. Diseases caused by lead or its compounds.

1.1.9. Diseases caused by fluorine or its compounds.

1.1.10. Diseases caused by carbon disulfide.

1.1.11. Diseases caused by halogen derivatives of aliphatic or aromatic hydrocarbons.

1.1.12. Diseases caused by benzene or its homologues.

1.1.13. Diseases caused by nitro- and amino-derivatives of benzene or its homologues.

1.1.14. Diseases caused by nitroglycerine or other nitric acid esters.

1.1.15. Diseases caused by alcohols, glycols or ketones.

1.1.16. Diseases caused by asphyxiants like carbon monoxide, hydrogen sulfide, hydrogen cyanide or its derivatives.

1.1.17. Diseases caused by acrylonitrile.

1.1.18. Diseases caused by oxides of nitrogen.

1.1.19. Diseases caused by vanadium or its compounds.

1.1.20. Diseases caused by antimony or its compounds.

1.1.21. Diseases caused by hexane.

1.1.22. Diseases caused by mineral acids.

1.1.23. Diseases caused by pharmaceutical agents.

1.1.24. Diseases caused by nickel or its compounds.

1.1.25. Diseases caused by thallium or its compounds.

1.1.26. Diseases caused by osmium or its compounds.

1.1.27. Diseases caused by selenium or its compounds.

1.1.28. Diseases caused by copper or its compounds.

1.1.29. Diseases caused by platinum or its compounds.

1.1.30. Diseases caused by tin or its compounds.

1.1.31. Diseases caused by zinc or its compounds.

1.1.32. Diseases caused by phosgene.

1.1.33. Diseases caused by corneal irritants like benzoquinone.

1.1.34. Diseases caused by ammonia.

1.1.35. Diseases caused by isocyanates.

1.1.36. Diseases caused by pesticides.

1.1.37. Diseases caused by Sulphuroxides.

1.1.38. Diseases caused by organic solvents.

1.1.39. Diseases caused by latex or latex-containing products.

1.1.40. Diseases caused by chlorine.

1.1.41. Diseases caused by other chemical agents at work not mentioned in the preceding items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to these chemical agents arising from work activities and the disease(s) contracted by the worker. In the application of this list, the degree and type of exposure and the work or occupation involving a particular risk of exposureshould be taken into account when appropriate.

1.2. Diseases caused by physical agents

1.2.1. Hearing impairment caused by noise.

1.2.2. Diseases caused by vibration (disorders of muscles, tendons, bones, joints, peripheral blood vessels or peripheral nerves).

1.2.3. Diseases caused by compressed or decompressed air.

1.2.4. Diseases caused by ionizing radiations.

1.2.5. Diseases caused by optical (ultraviolet, visible light, infrared) radiations including laser.

1.2.6. Diseases are caused by exposure to extreme temperatures.

1.2.7. Diseases caused by other physical agents at work not mentioned in the preceding items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to these physical agents arising from work activities and the disease(s) contracted by the worker.

1.3. Biological agents and infectious or parasitic diseases

1.3.1. Brucellosis.

1.3.2. Hepatitis viruses.

1.3.3. Human immune deficiency virus (HIV).

1.3.4. Tetanus.

1.3.5. Tuberculosis.

1.3.6. Toxic or inflammatory syndromes associated with bacterial or fungal contaminants.

1.3.7. Anthrax.

1.3.8. Leptospirosis.

1.3.9. Diseases caused by other biological agents at work not mentioned in the preceding items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to these biological agents arising fromwork activities and the disease(s) contracted by the worker.

2.Occupational diseases by target organ systems

2.1. Respiratory diseases

2.1.1. Pneumoconioses caused by fibrogenic mineral dust (silicosis, anthraco-silicosis, asbestosis).

2.1.2. Silicotuberculosis.

2.1.3. Pneumoconioses caused by non-fibrogenic mineral dust.

2.1.4. Siderosis.

2.1.5. Bronchopulmonary diseases caused by hard-metal dust.

2.1.6. Bronchopulmonary diseases caused by the dust of cotton (byssinosis), flax, hemp, sisal or sugar cane (bagassosis).

2.1.7. Asthma caused by recognized sensitizing agents or irritants inherent to the work process

2.1.8. Extrinsic allergic alveolitis caused by the inhalation of organic dust or microbially contaminated aerosols, arising from work activities.

2.1.9. Chronic obstructive pulmonary diseases caused by inhalation of coal dust, dust from stone quarries, wood dust, dust from cereals and agricultural work, dust in animal stables, dust from textiles, and paper dust, arising from work activities.

2.1.10. Diseases of the lung caused by aluminum.

2.1.11. Upper airways disorders caused by recognized sensitizing agents or irritants inherent to the work process.

2.1.12. Other respiratory diseases not mentioned in the preceding items where a direct link is 37 established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the disease(s) contracted by the worker.

2.2. Skin diseases

2.2.1. Allergic contact dermatoses and contact urticaria caused by other recognized allergy provoking agents arising from work activities not included in other items.

2.2.2. Irritant contact dermatoses caused by other recognized irritant agents arising from work activities not included in other items.

2.2.3. Vitiligo caused by other recognized agents arising from work activities not included in other items.

2.2.4. Other skin diseases caused by physical, chemical or biological agents at work not included under other items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the skin disease(s) contracted by the worker.

2.3. Musculoskeletal disorders

2.3.1. Radial styloid tenosynovitis due to repetitive movements, forceful exertions and extreme postures of the wrist.

2.3.2. Chronic tenosynovitis of hand and wrist due to repetitive movements, forceful exertions and extreme postures of the wrist.

2.3.3. Olecranon bursitis due to prolonged pressure of the elbow region.

2.3.4. Prepatellar bursitis due to prolonged stay in kneeling position.

2.3.5. Epicondylitis due to repetitive forceful work.

2.3.6. Meniscus lesions following extended periods of work in a kneeling or squatting position.

2.3.7. Carpal tunnel syndrome due to extended periods of repetitive forceful work, work involving vibration, extreme postures of the wrist, or a combination of the three.

2.3.8. Other musculoskeletal disorders not mentioned in the preceding items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the musculoskeletal disorder(s) contracted by the worker.

2.4. Mental and behavioral disorders

2.4.1. Post-traumatic stress disorder

2.4.2. Other mental or behavioural disorders not mentioned in the preceding item where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the mental and behavioural disorder(s) contracted by the worker.

3. Occupational cancer

3.1. Cancer caused by the following agents

3.1.1. Asbestos

3.1.2. Benzidine and its salts

3.1.3. Bis-chloromethyl ether (BCME)

3.1.4. Chromium VI compounds

3.1.5. Coal tars, coal tar pitches or soot

3.1.6. Beta-naphthylamine

3.1.7. Vinyl chloride

3.1.8. Benzene

3.1.9. Toxic nitro- and amino-derivatives of benzene or its homologues

3.1.10. Ionizing radiations

3.1.11. Tar, pitch, bitumen, mineral oil, anthracite, or the compounds, products or residues of these substances

3.1.12. Coke oven emissions

3.1.13. Nickel compounds

3.1.14. Wood dust

3.1.15. Arsenic and its compounds

3.1.16. Beryllium and its compounds

3.1.17. Cadmium and its compounds

3.1.18. Erionite

3.1.19. Ethylene oxide

3.1.20. Hepatitis B virus (HBV) and hepatitis C virus (HCV) 3.1.21. Cancers caused by other agents at work not mentioned in the preceding items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice,between the exposure to these agents arising from work activities and cancer(s) contracted bythe worker.

4. Other diseases

4.1. Miners' nystagmus

4.2. Other specific diseases caused by occupations or processes not mentioned in this list wherea direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure arising from work activities and the disease(s) contracted by the worker.

3.11 Current status of Occupational diseases/injuries and deaths

The information related to occupational injuries is based on the statistics provided by the Department of Labour and Occupational Safety. The segregated data such as clustered data on the Provincial level, sector data segregating the enterprise such as manufacturing, construction, etc.), and sex-segregated data of the accidents are not available in the Department of Labour and Occupational Safety. Most of the accidents recorded in the Labour and Employment officers' origins are from the manufacturing industries. It seems as if occupational accidents are scarce in Nepal. This is largely due to the underreporting of the events

although reporting of any type of accident is mandatory, its implementation is perceived to be lacking. The law prescribes mandatory notification on any fatal accidents and/or accidents causing -man-day losses. It is perceived that the majority of these accidents are unreported. Further, the data on the construction sector with a higher prevalence of accident rate is largely not covered. The magnitude of the problems and the number of accidents are much higher than the information provided by the available statistical indicators. The under-reporting of occupational accidents is primarily attributed to the lower level of awareness of OSH and the lack of sensitivity among management and workers in general. The causes of accidents are varied but the common causes of accidents in Nepal are due to lack of safety policy, lack of or poor implementation of manual and guidelines at the enterprises, the improper layout of workplace / unsafe workplace design, unsafe handling/use of chemicals, unguarded or inadequately guarded machinery, use of an unsafe machine (unsafe design and construction of machines), lack of adequate maintenance of machinery, inadequate ventilation at the workplace, unsafe electrical connection, inadequate/improper lighting system, lack of training of the workers, lack of supervision, use of an old or outdated machine or equipment, poor housekeeping and material handling, negligent or no use of safety gears and personal protective equipment, stretched working hour compounded with overload, lack of awareness on personal health and hygiene, lack of inspection and violation of safety rules. The accidents are categorized as major and minor ones. Any accident that does not make an injured person a disabled one and where the injured person gets first aid and returns to work is called a 75-minor accident. An accident causing permanent or prolonged disability and death of the employees is called a major accident.

3.12 Implementation of Occupational Safety and Health Standards

The government of Nepal has promulgated OSH standards in the workplace on Noise and Light during 2016 and this standard has been published in Nepal Gazette dated July 9, 2017. Besides these, the Government has also formulated the directives/guidelines for Brick industries in 2017. The guideline speaks about the Occupational Health and Safety of the workers. The permissible exposure limit (PEL) of noise for the workplace is 90dBAfor 8 hours, 95 dBA for four hours, 100 dBA for two hours, 105 dBA for one hour, 110 dBA for 30 minutes, and 115 dBA for 15 minutes a day in the workplace. The government has also recommended the minimum light illumination level for the workplace depending on the type of work and place. The lux (unit of illumination) should not be less than between 10 and 100. For the light, the standard stipulates, emergency exit and emergency pathways shall have 10 lux, inactive storage 20 lux, rough active storage, and warehouse 50 lux, machine work 100 lux, checking and sorting 300 lux, weaving dark-coloured woollen goods 500 lux and jewellery and watch manufacturing 1000 lux. Any local light, that is to say, an artificial light designed to illuminate, particularly the area or part of the area of work of a single operative or small group of operatives working near each other, shall be provided with a suitable shade of opaque material to prevent glare with other effective means by which the light source is completely screened from the eyes of every person employed at a normal working place, or shall be so placed that no such person is exposed to glare therefrom.

3.13 Integration of health services with occupational health services

In Nepal, occupational health is not integrated with the healthcare system of Nepal. Occupational safety and health to date remain under the mandate of the Ministry of labour, employment and Social Security and have no functional relationship with the structure within the Ministry of Health and Population.

The industrial history of Nepalese is rather short. To keep pace with the contemporary world, Nepal has been turning wheels at full speed and overlooking issues of occupational health and safety. The major obstacle to instilling the concept of OHS in Nepalese is the inability of stakeholders to grasp the utility and importance of OHS. Occupational health and safety procedures require adequate surveillance of the work environment and risk assessment, both of which are missing completely from most industries in Nepal. Neither have most industries health status. Control measures for preventive and emergency preparedness are so absent in most industries. Likewise, diagnostic procedures for occupational disease and recordkeeping of such events are inadequate. It will therefore take some time to develop the concept of

OHS with preventive, curative and rehabilitative measures under a single umbrella of OHS among entrepreneurs in Nepal. The barriers to OHS identified in Nepal can be generalized as follows:

- Lack of awareness concerning OHS at all levels
- Faulty legal systems and lack of periodic updates
- Inability to establish OHS as an integral component of working life
- Lack of professional expertise
- Resource constraints

3.14 Occupational disease and their diagnosis in the country

No health programs in Nepal address the prevention and control of occupational-related diseases and conditions. The major facade to installing the concept of OSH in Nepal lies in the inability of concerned stakeholders to grasp the utility and importance of occupational health services. Major obstacles in enforcing effective OSH practices in Nepal from the nation's perspective are the least priority of the government, lack of national strategy for OSH management, legal backup mechanism and focal point at government ministries. Few industries have taken prudent measures by establishing OSH setups thereby decreasing the vulnerability of hazards.

3.15 Budget

It is important that occupational health practitioners critically evaluate their practice and, through the application of the iterative audit cycle, improve the quality, effectiveness, and efficiency of their service. Audit is conventionally divided into structure (resources), process (procedures), and outcome (results). The use of audits should not be confined to clinical matters, and the inclusion of occupational health practitioners from other disciplines—for example, occupational hygiene or safety, will contribute to better services for all. For a service to report on its activities in a meaningful way, there needs to be in place a basic dataset that allows comparison between periods, different employee groups, or operational divisions. Data that may be appropriate include new appointments, review appointments, health surveillance activity, immunisations, referral reason, type of clinician (doctor or nurse), and diagnosis. This information is invaluable for presentation to management to show changes in activity or areas for which increased funding is needed when making a business case. It will also be useful when discussing issues from the perspective of occupational health in organizational meetings such as health and safety meetings, risk management, and when compiling an annual report or business plan. These data are ideally compiled in a computerized database, either bespoke or a commercially available occupational health software package.

The main enforcement body at the local levels and the specified areas are the Labour and Employment offices. The major activities carried out by these offices are monitoring the labour relations occupational safety and other health aspects in the establishment and enterprises as specified under the legislation. The Labour and Employment Offices at the local levels are headed either by the Labour Officer or the Factory inspector. The other staff members to support the activities of these offices are the non-gazette officers and the assistants.

4. Social protection and health assessment of Nepalese labour migrants

Nepal's National Health Policy 2019 seeks to minimize public health risks due to migration, particularly by ensuring accessibility of health services for Nepalese migrants abroad. (16) Health assessment of Nepalese Labour Migrants (NLMs) is a mandatory procedure before departure, which is done through government-

approved pre-departure private medical assessment centres. The health records from these assessment centres are first recorded in paper-based form and then entered into an online electronic form to be stored by the DoFE. The filled-up paper forms are sent to District Health Offices, which further report the data to the Department of Health Services (DoHS), Ministry of Health and Population (MoHP) and associated governmental infectious diseases centres. However, there is no formal health assessment of NLMs upon arrival to Nepal. (17)

In 2021/22, 1395 Nepali migrant workers (including 39 women) were reported to have died, with most deaths certified as having occurred due to 'natural causes' in and by Country of Department (CoDs). More than 150 cases of deaths of Nepali migrant workers have each been reported annually in Malaysia, Saudi Arabia, Qatar and the UAE in 2019/20–2021/22. In addition, a significant number of Nepali migrant workers return home with mild to severe injuries and illnesses. The health risks migrant workers face are linked to their exposure to occupational safety and health hazards, poor working and living conditions, lack of access to social protection, including medical/health services, language and cultural barriers, and forced overtime labour, among others. The FEB disbursed a total of NPR 769.95 million (USD 5.9 million) as financial assistance to 1395 families of deceased migrant workers in 2020/21 through the Foreign Employment Welfare Fund (FEWF). Nepali migrant workers have been subjected to an exploitative recruitment process, employment contract fraud and abuse by employers. Women migrant workers are especially vulnerable to violence and face risks of abusive treatment in many countries of destination. More than 1300 new cases related to such fraud, abuse and exploitation were filed at the FET between 2019/20 and 2021/22. MoLESS has adopted and implemented a range of policies and legal instruments to address these issues. These include a ban on the use of agents, conferring rights to the Chief District Officer (CDO) to investigate and punish individual agents involved in fraud and cheating, and an 'employer pays' model for recruitment. The government has also prioritized the reintegration of migrant workers through skill development and certification, and also programmes dealing with financial literacy, vocational training, recognition of prior learning, psychological support, and shelter. Through the Reintegration Programme (Operation and Management) Directive for Returnee Migrant Workers, 2022, the government has stressed three diverse yet inter-related dimensions of the reintegration efforts: social integration, employment, and entrepreneurial development.

Health and safety of migrant workers: MoLESS recognizes the need to carry out regular and effective inspection of the workplace and living conditions of migrant workers. In line with this report's findings that a large number of Nepali migrant workers are employed in unsafe employment practices, MoLESS notes the need to organise occupational safety and health training for migrant workers prior to and after their arrival in the Country of Departsment (CoD)s in coordination with Nepali diplomatic missions. MoLESS also realises the importance of informed migration, sensitization, greater awareness, and the need for implementing country-specific PDOT curriculums as well as post-arrival orientation. MoLESS will continue engaging with CoDs to ensure that employers implement standard occupational safety and health protocols at the workplace.

4.1 Social protection

It has been recognized that the establishment of a bilateral social security mechanism could enhance the protection of migrant workers. MoLESS will continue to explore ways by engaging with employers' and workers' organisations on how this can be designed and implemented in a way that is gender responsive and also sensitive to the condition of workers in the informal sector. Priority will be given to the inclusion of migrant workers in the social security scheme in Nepal, namely the Social Security Fund (SSF). The study conducted by the International Labour Organization found an average death rate of 0.16% (4322 deaths out of a total of 2,723,587 labour permits) in the 7 years from 2008/09 to 2014/15.[14] The major causes of death, as reported, were cardiac arrest (941 cases or 21.8%), natural causes (847 cases or 19.6%), and other or unidentified causes (795 cases or 18.4%). Suicide was the major cause of death among female NLMs (33% of all female migrant worker deaths). Almost 97% of these deaths occurred in GCC countries

and Malaysia with the highest being in Malaysia followed by Saudi Arabia, Qatar, and United Arab Emirates

4.2 Health assessment of labour migrants

The government of Nepal has made legal arrangements in case of migrant worker's health check-ups. (18) A Nepalese migrant worker has to obtain a certificate of fitness from a government-approved medical centre in Nepal with a government-approved HOLOGRAM issued by NHPF affixed on the Report Card. A Migrant Worker who has got a medical checkup done from a government-approved medical centre and has a hologram affixed medical report, if departed due to medical reasons within 2 months from a medical test, is liable for compensation. Medical Center or Health Institute is not liable to pay compensation to a migrant worker returning due to sexually transmitted diseases, HIV/AIDS. gonorrhoea, syphilis, hepatitis B or C, Jaundice, High BP, or Contagious Diseases. There are numerous health institutions in Nepal. However, all of them are not authorized to conduct medical tests for foreign employment purposes. Migrant workers must make sure that the medical centre is listed by the Government of Nepal to conduct medical checkups for foreign employment. The list of investigations suggested for foreign manpower employment is recognized by the Ministry of Health and Population, Nepal. (19)

Table 4: List of investigations suggested for foreign labour migrants

S.N.	TEST	RATE
1	X-RAy	300
2	HB	55
3	TC	60
4	DC	60
5	ESR	65
6	Urine	60
7	Stool	70
8	Sugar	60
9	Urea	110
10	Creatinine	125
11	MP	90
12	MF	95
13	Blood Grouping	80
14	LFT(Billrubin Total/Direct, SOPT and SGOT)	460
15	Syringe (5 ml)	5

16	Syringe (Vaccumator)	25
17	HIV	420
18	HBSAG	350
19	Anti HCV	540
20	VDRL/RPR	130
21	IPHA	385
22	Physical Consultation	As per GoN Standard
23	Pregnancy Test	160
24	Platelet Count	75
25	Gama GT	450
26	Lipid Profile	600
27	Total Protein	120
28	PFT	300
29	Mantoux test	120
30	Cannabis	350
31	Opaite	350
32	ECGs	205
33	USG	600
34	Audiogram	300
35	MMR Vaccine	500
36	EEG	1100
37	Alkaline Phosphate	190

Source: https://nepalhpf.org.np/

The below listed medical centers have been approved by the Ministry of Health and Population of the Government of Nepal to Provide medical checkup services to Nepalese people going abroad on foreign employment. Thus, they are authorized to conduct medical tests.

Table 5: List of government approved health institutions for health screening to labour migrants

SN	Regd. No.	Name of the Health Institution	Address
1	1	Dhorpatan Polyclinic Pvt. Ltd.	Gongabu - 4, Kathmandu
2	2	Singapurgorkha Polyclinic pvt. Ltd.	koteshwor 35, Kathmandu
3	3	Helping Health Medical Centre Pvt. Ltd.	Gongabu - 5, Naya Bus Park, Kathmandu
4	4	Abida International Medical Center	Itahari-1, Sunsari
5	5	N.M.C. Diagnostic Medical Center	Linkroad, Birjung,Parsantaj miya
6	6	Helping Health Diagnostic Centre	Basundhara - 3, Kathmandu
7	7	Bishwas Medical And Polyclinic pvt.Ltd.	Tribhuwanpark-10 ,Ghorahi, Dang
8	9	Munal Diagnostic Center Pvt.Ltd	Itahari-1, Sunsari
9	10	Chhabdi Barahi Tanahu Polyclinic	Gongabu-4, Kathmandu
10	11	Prime Health Care Centre Pvt. Ltd.	Chabahil - 7, Kathmandu
11	13	Janamaitri Hospital Pvt. Ltd.	Balaju Chowk, Kathmandu
12	14	Prudential Medical Center Pvt.Ltd	Baneshwor
13	16	Rakshya polyclinic And Diagnostic center pvt.Ltd.	Gongabu, Nayabaspark, Kathmandu
14	17	Anugraha Polyclinic Pvt. Ltd.	Nayabaspark-29 , Kathmandu
15	18	Family Health Care International & Research Centre Pvt. Ltd.	Dhumbarahi Chowk, Kathmandu
16	19	Alisa Polyclinic Pvt. Ltd.	Sitamangal Kalimati tol, Kathmandu
17	20	Khajana Medical & Polyclinic Centre Pvt. Ltd.	K.M.C. - 9, Pingalasthan, Kathmandu
18	21	Alkhaleej Medical Center Pvt. Ltd.	Kathmandu - 7, Chucheepati
19	22	Sulav Health Polyclinic And Pathology Pvt. Ltd.	Maitidevi-32, sastrimargh, Kathmandu
20	23	Medidia Diagnostic Center Pvt Ltd	Bansbari. Kathmandu
21	24	Ma Janaki International Polyclinic & Diagnostic Center Pvt.Ltd	Old Baneshwor, Kathmandu
22	25	Fishtail Imaging & Diagnostic Centre Pvt. Ltd.	Ghairapatan - 4, Pokhara

23	26	LifeCare Prince Diagnostic Center Pvt Ltd	Tripureshwor, Kathmandu
24	27	Kantipur Diagnostic Centre Pvt. Ltd.	Kantipath, Jyatha, Kathmadu
25	28	Jaljala Polyclinic And Diagnostic Center Pvt. Ltd.	Nayabaspark-4, Kathmandu
26	29	Sumeru Diagnostic Centre Pvt. Ltd.	Pulchowk - 3, Lalitpur
27	30	Sikhar Medical And Diagnostic Center Pvt.Ltd.	Gongabu, Nayabapark, Kathmandu
28	31	Anurag Polyclinic And Medical Center Pvt.Ltd	Gaushala , Kathmandu
29	32	Samajkalyan Polyclinic And Diagnostic Center Pvt.Ltd.	Gongabu-3, Kathmandu
30	33	Sai Kripa Polyclinic And Medical Center Pvt.Ltd	Gongabu-5, Kathmandu
31	34	Srijanshi Polyclinic Pvt.Ltd.	Gothatar-8, Kathmandu
32	35	Madina Medical Center Pvt Ltd.	Kalimati Tole-9, Kathmandu
33	36	Saiba Medical Center Pvt Ltd.	Jwagel-10, Lalitpur
34	37	Saudi Medical Centre Pvt. Ltd.	Kupondole, Lalitpur
35	39	Health Care Clinic	Tripureshwor, Kathmandu
36	40	Life Trust Medi Diagnostic Pvt. Ltd.	Anandanagar Marg, Dhubarahi , Kathmandu
37	41	Siddhi Polyclinic Health Services Pvt Ltd.	Dillibazar, Kathmandu
38	47	Helping Health Polyclinic Pvt. Ltd.	Maitidevi, Kathmandu
39	48	Pooja Diagnostic Center Pvt.Ltd	Birtamod, Jhapa
40	49	Pradhan Diagnostic Center Pvt.Ltd	Birtamod, Jhapa
41	52	Nishant Medical Diagnostic Center Pvt.Ltd.	Damak-11, Jhapa
42	53	Aarambha medical And Diagnostic Center Pvt.Ltd.	Itahari-1, Sunsari
43	54	Kankai Diagnostic Center Pvt.Ltd.	Anarmani-3, Jhapa
44	55	Sudha Medical & Diagnostic Centre Pvt. Ltd.	Sinamangal, Kathmandu
45	56	Buddha Diagnostic And Medical Services Pvt.Ltd.	Damak-11, Jhapa
46	57	L & R Polyclinic & Diagnostic Center Pvt Ltd	Tilganga, Kathmandu
47	57	Omkar Polyclinic, Medical Diagnostic And Therapeutic Center Pvt.Ltd.	Bagdol-4, Lalitpur
48	58	Samrat Polyclinic And Medical Center Pvt.Ltd.	Chhabahil-7, Kathmandu

49	59	Diamond Polyclinic And Diagnostic Center	Samakhusi-29, Kathmandu
50	60	Birtamod Diagnostic Center Pvt.Ltd.	Anarmani-2, Jhapa
51	61	Eon Medical Center Pvt.Ltd.	Lazimpat-2 , Kathmandu
52	62	Ekata Medical Centre Pvt. Ltd.	Anamnagar 32, Kathmandu
53	63	Al Masur Diagnostic Center Pvt Ltd	New Baneshwor, Kathmandu
54	64	Aqua Diagnostic Services Pvt Ltd.	Pinglasthan-9, Kathmandu
55	65	Rajam Medical Centre Pvt. Ltd.	Kathmandu 7, Chabahil, Kathmandu
56	66	Sudha Polyclinic Pvt Ltd	Koteshwor-35, Kathmandu
57	67	South Asian Health Care Centre Pvt. Ltd.	Gaushala - 9, Kathmandu
58	68	Dynasty Medical Centre Pvt. Ltd.	Gaushala, Pingalasthan, Kathmandu
59	69	Green City Hospital Pvt Ltd	Dhapasi-8, Kathmandu
60	72	Chhimeki Polyclinic Pvt.Ltd.	Santinagar, Kathmandu
61	73	Himal International Medical Center Pvt Ltd.	Shantinagar Gate, Kathmandu
62	74	Trishuli Medical & Clinic Pvt. Ltd.	Sinamangal - 9, Kathmandu
63	75	Namaste Nepal Medical Center & Polyclinic Pvt Ltd	Gongabu, Kathmandu
64	76	Kasthamandap Health Care Pvt. Ltd.	Battisputali, Kathmandu
65	77	Kaniska Health Care Centre Pvt. Ltd.	Tinkune, Kathmandu
66	78	Frendship Health care center Pvt.Ltd.	Maharajgunj , Kathmandu
67	79	Remind Polyclinic Diagnostic Center Pvt.Ltd.	ka.ma.na.pa.-9, Kathmandu
68	80	Buddha International Medical Center Pvt Ltd	New Baneshwor Kathmandu
69	84	Kantipur Medicla Center	Itahari-1, Sunsari
70	85	Saksham Medical Centre Pvt. Ltd.	Gongabu - 29, Kathmandu
71	85	Sahara Health Care Pvt Ltd	New Baneshwor, Kathmandu
72	86	Panasiya Medical Center Pvt.Ltd	Newbaneshwor, Santinagar, Kathmandu
73	87	World Wide Medical Center Pvt Ltd	Battisputali-9, Kathmandu
74	87	Moulakali Polyclinic Diagnostic Center Pvt.Ltd.	Samakhusi-9, Kathmandu
75	88	Peace Medical Center Pvt Ltd	Bashundhara-3, Kathmandu

76	88	Kohalpur Health Care Pvt.Ltd.	Kohalpur-3 , Banke
77	89	Upatyaka Pathology & Clinic Pvt. Ltd.	Pulchowk - 3, Lalitpur
78	90	Apple International Polyclinic Pvt. Ltd.	Tripureshwor, Kathmandu
79	91	Nepal Janata Diagnostic And Polyclinic pvt.Ltd.	Koteshwor-35, Kathmandu
80	92	Sunshine Medical Centre Pvt. Ltd.	Naya Baneshwor, Kathmandu
81	92	Sunapati Polyclinic & Health Center Pvt Ltd	Gwarko, Lalitpur
82	92	Cosmos Medical Center Pvt Ltd	Gaushala, Kathmandu
83	93	Sunshine Health care Center Pvt.Ltd	Prithivi chowk, Pokhara
84	94	Lalupate Medical Center Pvt Ltd.	Pinglasthan-9, Kathmandu
85	95	Shree Janasewa Polyclinic And Medical Center Pvt.Ltd	Koteshwor-35, Kathmandu
86	96	Himalay Diagnostic Clinic	Koteshwor-35, Kathmandu
87	97	Merapick Medical Center Pvt.Ltd.	Mitrapark, Chabahil, Kathmandu
88	98	Glory Medical Centre Pvt. Ltd.	Basundhara - 3, Kathmandu
89	99	Ghumanu LIfecare Medical And Diagnostic Center Pvt.Ltd	Damak-11, Jhapa
90	100	Royal Medical Center Pvt.Ltd.	Bhagawanbahal, Thamel, Kathmandu
91	101	Titan Health Care Centre Pvt. Ltd.	Basundhara - 3, Kathmandu
92	102	Sudha Medical Center Pvt.Ltd.	Butwal-8, Rupandehi
93	103	Everest International Polyclinic Diagnostic center Pvt.Ltd	Nepalgunj-13 , Banke
94	104	Alka Hospital Pvt.Ltd.	Jawalakhel, Lalitpur
95	105	Madhyapaschim Polyclinic Pvt. Ltd.	Nepalgunj - 13, Banke
96	106	Subba Pathology And Clinic Pvt.Ltd.	Kupandol, Lalitpur
97	107	Sunsari Diagnostic Center Pvt.Ltd.	Itahari-1 , Sunsari
98	108	All Nepal Hospital Pvt Ltd	Samakhusi-29, Ranibari Marg
99	109	P.K. Diagnostic Center Pvt.Ltd.	Sinamangal-9, Kathmandu
100	110	Community Health Care Cooperative Ltd.	Itahari - 1, Sunsari
101	111	Budha Subba Medical Centre Pvt. Ltd.	Damak 11, Jhapa

102	112	Dikshya Swastya Sewa Kendra Pvt.Ltd.	Janakpur-8, Dhanusha
103	113	Nepolian Health Care Center Pvt.Ltd.	Balaju-16, Kathmandu
104	114	U.V. Swasthya clinic Pvt.Ltd.	Basundhara-3, Kathmandu
105	115	Asian Polyclinic Diagnostic Center Pvt.Ltd	Bagbajar, Kathmandu
106	116	Asian Plus Medical Center Pvt.Ltd.	Gongabu-5, Kathmandu
107	117	Siddhartha Polyclinic Pvt.Ltd.	Bagbajar, Kathmandu
108	118	Nepal Siddharth Sadan Polyclinic Pvt.Ltd	Gongabu-4, Kathmandu
109	121	Nippon Polyclinic And Diagnostic Center Pvt.Ltd.	Sherchan Plaza, Balaju-16, Kathmandu
110	122	Medicare National Polyclinic Pvt.Ltd.	Bashundhara-3 , Kathmandu
111	123	Kuleshwor Polyclinic Pvt. Ltd.	Kuleshwor - 14, Kathmandu
112	124	Paradise International Medical Centre Pvt. Ltd.	Kupondole - 10, Lalitpur
113	125	Everest Health Home Services Pvt Ltd	Mid Baneshwor, Kathmandu
114	126	Satyasai Diagnostic Center Pvt.Ltd.	Gouridhara, Tukucha, Kathmandu
115	127	Siddhakali Medical And Polyclinic Center Pvt. Ltd.	Gongabu-4, Kathmandu
116	128	Asia Pacific Polyclinic Pvt.Ltd	ka.ma.pa.-11,Thapathali, Kathmandu
117	129	Kist Polyclinic And Medical Center Pvt.Ltd.	Balkumari,Kharibot-8, Lalitpur
118	130	Golfspring Medical Center Pvt.Ltd	Basundhara-3, Kathmandu
119	131	Well Care Hospital & Research Centre Pvt. Ltd.	Maitidevi, Ratopool, Kathmandu
120	132	Universal Diagnostic Center Pvt.Ltd.	Putalisadak-32, Kathmandu
121	134	Goldengate Polyclinic And diabetes Center Pvt.Ltd	Nakkhuchowk-13, Lalitpur
122	135	Siddharth Pathology	Pokhara, Kaski
123	136	Purnima Medical Centre Pvt. Ltd.	Lalitpur - 10, Jwagal
124	137	Purnima Plus Medical Center Pvt.Ltd.	Gongabu-29, Kathmandu
125	138	Purnachandra Diagnostic Center Pvt.Ltd	Gausala, Kathmandu
126	140	Baba Medical Center Pvt.Ltd.	Chappal karkhana-4, Kathmandu
127	141	Aruna Medical Center Pvt.Ltd	Samakhusi-29, Kathmandu
128	142	Pooja Medical Diagnostic Center Pvt.Ltd	Batisputali-9, Kathmandu

129	143	Fusion Swasthya Polyclinic Pvt.Ltd	Maharajgunj, Kathmandu
130	145	United Diagnostic Center Pvt.Ltd	Sinamangal-9, Kathmandu
131	146	Maata mahalaxmi Medicare Pvt.Ltd.	Batisputali-9, Kathmandu
132	147	Sinamangal Healthcare And Diagnostic Center Pvt.Ltd.	Sinamangal-9, Kathmandu
133	149	Sagarmatha Polyclinic And Diagnostic Center Pvt.Ltd.	Kalimati chowk-13, Kathmandu
134	150	Aashirbad Swasthya sewa clinic	Balkhu-14, Kathmandu
135	152	South Asian Polyclinic And Diagnostic Center Pvt.Ltd.	Goushala-9, Kathmandu
136	153	Praptee Polyclinc Pvt.Ltd	Tripureshwor, Kathmandu
137	154	Bhanu Memorial Polyclinic And Diagnostic Center Pvt.Ltd.	Gongabu Chowk-4, Kathmandu
138	155	Bright Polyclinic & Diagnostic Centre Pvt. Ltd.	Samakhusi - 29, Kathmandu
139	156	Bindhyabasini Medical And Research Center Pvt. Ltd.	Tinkune, Kathmandu
140	157	Lumbini Diagnostic And Research Center Pvt.Ltd	Butwal
141	158	B.B. Health Care Center Pvt.Ltd	Balaju-16 , Kathmandu
142	159	Aishwarya Polyclinic And Diagnostic Center Pvt.Ltd	Balaju-16, Kathmandu
143	160	Janaki International Medical Center Pvt.Ltd.	Nayabuspark, Kathmandu
144	162	Shailung Polyclinic And Diagnostic Center Pvt.Ltd.	Itahari-1, Sunsari
145	163	Saibaba polyclinic And Medical Center Pvt.Ltd.	Gongabu-29, Kathmandu
146	164	Safal Medical Center Pvt.Ltd.	Sinamangal-9, Kathmandu
147	166	Tribeni Devi Polyclinic And Health Care Center Pvt.Ltd	Samakhusi-29, Kathmandu
148	167	Sewa Polyclinic Pvt.Ltd.	Basundhara-3 , Kathmandu
149	168	Trimurti Medical Center Pvt Ltd	Dhapasi-8,Bashundhara, Kathmandu
150	169	Namuna Medical Center Pvt.Ltd	Oldbaneshwor, Kathmandu
151	170	Sunrise Polyclinic & Diagnostic Center Pvt Ltd	Maharajung, Kathmandu
152	171	Asian Raze Medical Centre Pvt. Ltd.	Chappal Karkhana - 4, Kathmandu

153	173	M.V. Polyclinic And Diagnostic Center	Sinamangal-9, Kathmandu
154	174	Perfect Diagnostic Center Pvt.Ltd.	Battisputali-9, Kathmandu
155	175	Frontline Polyclinic Centre Pvt. Ltd.	Himshikhar Marga - 34, Kathmandu
156	176	H.R. Diagnostic Center Pvt.Ltd.	Battisputali-9, Kathmandu
157	177	Life Medical Center	Kalimatidol-9, Kathmandu
158	178	Syrup Health Care Center Pvt Ltd	Dhapasi-8, Kathmandu
159	179	Syrup Medical Center Pvt.Ltd.	Gongabu-29, Kathmandu
160	181	Nagarjun Health Care Center Pvt.Ltd	Balaju-16, Kathmandu
161	182	Ombuddha Medical Center Pvt.Ltd	Sankhamul-10, Kathmandu
162	183	Fusion Polyclinic & Diagnostic Centre Pvt. Ltd.	Shankhamul Road, Naya Baneshwor, Kahtmandu
163	184	Suryodaya Medical Center Pvt.Ltd.	Kuleshwor-14, Kathmandu
164	185	Santipur Polyclinic Pvt.Ltd.	Thulobharyang, Kathmandu
165	186	Shikhar Public Polyclinic Center Pvt Ltd	Gongabu - 29, Kathmandu
166	187	City Top Polyclinic & Medical Center Pvt Ltd	Sinamangal-9, Kathmandu
167	188	Relief Health Care Pvt.Ltd.	Lazimpat-2, Kathmandu
168	189	N.S. Medical Center Pvt.Ltd.	Gongabu-4, Kathmandu
169	190	Valley Polyclinic International Health Center Pvt Ltd	Samakhusi-29, Kathmandu
170	191	International Health care And Diagnostic Center pvt.Ltd.	Newbaneshwor, Kathmandu
171	193	Sudha Health Care Pvt. Ltd.	Maharajgunj, Kathmandu
172	194	Texas Polyclinic & Diagnostic Centre Pvt. Ltd.	Bimansthal - 9, Kathmandu
173	195	Social Medical Health Care Center Pvt.Ltd	Gongabu chowk, Kathmandu
174	196	Markopolo Medical Center Pvt.Ltd	Samakhusi-29 , Kathmandu
175	197	AQuality Health Care & Diagnostic Centre Pvt. Ltd.	Sinamangal - 9, Kathmandu
176	198	Trust Medical Centre Pvt. Ltd.	Dhumbarahi, Kathmandu
177	199	K. R. Medical Centre Pvt. Ltd.	Samakhusi - 29, Kathmandu
178	200	Alfresco Polyclinic Pvt.Ltd.	Balaju-16, Kathmandu

179	201	Shavya Medical Center Pvt.Ltd	Maharajgunj Kathmanu
180	202	A Clinic For Health Nepal Pvt. Ltd.	Narayan Gopal Chowk, Kathmandu
181	205	Paradise Polyclinic & Diagnostic Centre Pvt. Ltd.	Basundhara - 3, Kathmandu
182	206	Unicorn Polyclinic Pvt.Ltd.	Pingalasthan, Kathmandu
183	207	Gurudev Diagnostic & Polyclinic Centre Pvt. Ltd.	Balaju - 16, Kathmandu
184	208	Samrat Medical Hall Pvt.Ltd.	Kalimatidol-9, Kathmandu
185	209	Sarbottam Polyclinic Pvt. Ltd.	Basundhara - 9, Kathmandu
186	210	Sungava Polyclinic Pvt.Ltd.	Newbaneshwor, Ekata marga, Kathmandu
187	211	Revive Polyclinic Pvt.Ltd	Pingalasthan, Kathmandu
188	213	Chetana Swastaha Sewa Kendra Pvt. Ltd.	Minbhawan, Shantinagar, Kathmandu
189	214	Nawadurga Polyclinic Pvt.Ltd.	Anamnagar, Kathmandu
190	215	Top Need Medical Centre Pvt. Ltd.	Gongabu - 04, Samakhusi, Ring Road
191	216	Oscar Medical Center Pvt.Ltd.	Dhapasi-9, Bashundhara, Kathamandu
192	217	Pathivare Medical Center Pvt.Ltd.	Hanumansthan -11, Itahari
193	218	Royal Nepal Polyclinc And Diagnostic Center Pvt.Ltd.	Gongabu-29, Kathmandu
194	219	Medicine Buddha Polyclinic Pvt.Ltd.	Gongabu-4, Newbuspark, Kathmandu
195	220	Tribeni Medical Center Pvt.Ltd	gaushala, Pingalastan, Kathmandu
196	221	Sampripti Medical Center Pvt.Ltd.	Mitranagar, Newbuspark, Kathmandu
197	222	Maa Laxmi Polyclinic Pvt.Ltd.	Saamakhusi -29, Kathmandu
198	223	Super Healthcare And Diagnostic Center	Gongabu, New buspark, Kathmandu
199	224	Lotus Polyclinic And Diagnostic Center Pvt.Ltd	Gongabu, Newbuspark, Kathmandu
200	225	Super Diagnostic Center Pvt.Ltd.	Saamakhusi-29, Kathmandu
201	226	OM Siddhi Polyclinic And Medical Center pvt.Ltd.	Sundhara-11, Kathmandu
202	227	Bright Medical Center Pvt.Ltd.	Gongabu, Kathmandu
203	228	Nepal Janaswathya Kendra Pvt.Ltd	Balaju-16, Kathmandu
204	229	Dhaulagiri Health Care Center Pvt.Ltd	Newbuspark, Kathmandu

205	230	Namo Buddha Medical Centre Pvt. Ltd.	Gaushala, Kathmandu
206	231	Akbar Medical Center Pvt.Ltd.	Tilganga, Kathamndu
207	232	Healthy Life International Medical Center	Anamnagar , Kathmandu
208	233	Nozomy Polyclinic Pvt.Ltd.	Sinamangal-9 , Kathmandu
209	234	Janata Medical Center Pvt.Ltd.	Tinkune, Kathmandu
210	235	Megha Medical Center Pvt.Ltd.	Saamakhusi-29, Kathmandu
211	236	Sai Polyclinic And Diagnostic Center	Sankhamul-10, Newbuspark
212	237	Swarnim Polyclinic Pvt.Ltd.	Sundhara-3, Kathmandu
213	238	Capital Medical Center Pvt.Ltd.	Kathmandu-29, Mitranagar
214	240	Space Medical Center Pvt.Ltd.	Chabil-7, Kathmandu
215	241	Public Health Polyclinic & Diagnostic Centre Pvt. Ltd.	Samakhusi - 29, Kathmandu
216	242	Shan Health Care & Polyclinic Pvt. Ltd.	Battisputali - 29, Kathmandu
217	243	Reliable Polyclinic And Pyathology Lab Pvt.Ltd.	Kupandol, Laliypur
218	244	Nita Polyclinic And Diagnostic Center Pvt.Ltd.	Maharajgunj-3, Kathmandu
219	245	Reliance Medicare And Research Center Pvt.Ltd	Gaushala, Ratopul, Kathmandu
220	250	Subba Medical Center Pvt.Ltd	Bashundhara-3, Kathmandu
221	251	Prashanti Health Care Center Pvt.Ltd.	Jawalakhel-3, Pulchowk,Lalitpur
222	252	New World View Medical Centre	Basundhara - 3, Kahtmandu
223	254	Clink Medical Centre Pvt. Ltd.	Kalimati Dol, Kathmandu
224	255	Reliance Health Care Center Pvt.Ltd.	Dhapasi-9, Kathmandu
225	256	Amitav Buddha Medical Centre	Narayan Gopal Chowk, Kathmandu
226	256	Universal Medical health Care Center Pvt.Ltd	Mitranagar, Gongabu, Kathmandu
227	259	Srijana Medical Centre & Polyclinic Pvt. Ltd.	Chabahil - 7, Kathmandu
228	260	Om Medical Diagnostic Centre Pvt. Ltd.	Birtamode - 1, Jhapa
229	261	Seasons Polyclinic Pvt.Ltd.	Gongabu-5, Kathmandu
230	262	Merit Multicare Medical Center	Madhyamarga, Santinagar, Kathmandu

231	263	Riza Polyclinic And Diagnostic Center Pvt.Ltd.	Chabahil-7, Kathmandu
232	264	Jalbinayak Polyclinic And Medical Center	Gongabu-4, Newbuspark, Kathmandu
233	265	Meridian Health Care Pvt. Ltd.	Maharajgunj, Kathmandu
234	267	Manjushree Medical Center Pvt.Ltd.	Gouridhara, Tukucha, Kathmandu
235	268	Kshemadevi Polyclinic Pvt Ltd	Baneshwor
236	269	Asian Medical Diagnostic Center Pvt.Ltd.	Samakhusi-29, Kathmandu
237	270	Dhorpatan Medical Centre Pvt. Ltd.	Samakhusi - 29, Kathmandu
238	271	D.N.A. Polyclinic And Medical Center Pvt.Ltd	Gongabu, Kathmandu
239	273	Curex Diagnostic Center Pvt.Ltd	Basundhara-3, Kathmandu
240	274	International Polyclinic And Diagnostic Center Pvt.Ltd.	Birtamod, Jhapa
241	275	Kohinoor Medical Center Pvt.Ltd.	Narayangopal chowk, Kathmandu
242	276	J.M. Medical Center Pvt.Ltd.	Tripureshwor, Kathmandu
243	277	Dynamic Medical Center And Polyclinic Pvt.Ltd	Sukedhara-4, Tamuplaza, Kathmandu
244	278	Kankai Hospital Pvt.Ltd	Birtamod, Jhapa
245	279	Janakpur International Polyclinic And Diagnostic Center Pvt.Ltd.	Janakpur-7, Dhanusha
246	280	D. And P. Polyclinic And Diagnostic Center Pvt.Ltd	Balaju-16, Kathmandu
247	281	Bharatpur Diagnostic Center Pvt.Ltd	Bharatpur-10, Chitawan
248	282	Biratnagar Hospital Pvt. Ltd.	Biratnagar
249	283	Om Polyclinic & Medical Centre Pvt. Ltd.	Itahari - 1, Sunsari
250	284	Sagarmatha Clinic And Medical Center	Samakhusi-29, Kathmandu
251	286	Subarna Medical & Research Pvt. Ltd.	Ghorahi Municipality, Dang
252	289	Manmohan Memorial Purwanchal Chhetriya Samudayik Hospital	Anarmani-3, Jhapa
253	290	Nepal Diagnostic Center Pvt.Ltd.	Sundhara-11, Kathmandu
254	291	Samanantar Polyclinic Medical Center Pvt Ltd.	Bashundhara-3, Kathmandu
255	292	Akhanda Polyclinic Pvt.Ltd.	Battisputali-9, Kathmandu
256	293	Diamond Polyclinic Pvt.Ltd.	Mitranagar-29, Kathmandu

257	294	Shanti Buddha Medical Center Pvt.Ltd	Laxmipur-4, Jhapa
258	296	Cambridge Medical Institute Pvt.Ltd	Biratnagar, Morang
259	297	Global Medical Center Pvt.Ltd.	Saamakhusi Chowk, Kathmandu
260	298	Green Medical Center Pvt.Ltd	Gousala , Pingalasthan, Kathmandu
261	299	Buddha Sai Diagnostic Center Pvt.Ltd.	Itahari-1, Sunsari
262	301	U. and P. Polyclinci Pvt.Ltd	Suizatar-1, Kalanki , Kathmandu
263	302	Alliance Medical And Research Center Pvt.Ltd	Banasthali chwok, Kathmandu
264	303	S. S. Polyclinic Pvt. Ltd.	Narayan Gopal Chowk, Kathmandu
265	305	Dibyajyoti Polyclinic Pvt.Ltd	Newbaneshwor-34, Kathmandu
266	326	Bindhyawasini Medical Center Pvt Ltd	Dhapasi
267	306s(01)	Shubhalaxmi Diagnostic Center Pvt.Ltd	Anarmani-3 Jhapa
268	307(02)	Godawari Diagnostic Pvt.Ltd.	Anarmani-3, Jhapa
269	308(03)	Rose International Medical Center Pvt.Ltd	Gongabu-29, Kathmandu
270	309(04)	Diyas Polyclinic And Medical Center Pvt.Ltd	Sundhara-11, Kathmandu
271	310(05)	Metro Clinic Pvt.Ltd	Thapathali-11, Kathmandu
272	311(06)	Meditech Hospital Anusandhan Kendra	Butwal, Rupandehi
273	312(07)	United Medical Center Pvt.Ltd	Lazimpat-2 , Kathmandu
274	313(08)	Madhu Health Service And Counseling Center	Bashundhara-3, Kathmandu
275	314(09)	Nawajiban Hospital Pvt.Ltd.	Dhangadhi, Kailali
276	315(10)	Health Care Diagnostic Pvt.Ltd	Sinamangal, Kathmandu
277	316(11)	Kunta Polyclinc Pvt.Ltd	Tilganga, Kathmandu
278	318(13)	Ojaswi Polyclinic Pvt.Ltd.	Narayangopal chowk, Kathmandu
279	319(14)	Shubham polyclinic And Diagnostic Center Pvt.Ltd	Newbaneshwor chowk, Kathmandu
280	320(15)	Star Health Care Diagnostic Center	Kupandol-1, Lalitpur
281	322(17)	Anmol Medical Center Pvt.Ltd	Sinamangal-9, Kathmandu
282	323(18)	Manjushree Polyclinic And Diagnostic Center Pvt.Ltd	Dharan-9, Sunsari
283	324(21)	peoples Health Care center	Kathmandu-2

284	325(20)	Himal Medical Center	Swayambhu, Kathmandu

Source:https://nepalhpf.org.np/(20)

Table 6: The general characteristic of medical centers.

	N = 284
Province	
Koshi	28 (10%)
Madhesh	3 (1%)
Bagmati	241 (85%)
Gandaki	3 (1%)
Lumbini	8 (3%)
Karnali	0 (0%)
Sudurpashchim	1 (1%)

The above listed medical centers have been approved by the Ministry of Health and Population of the Government of Nepal to provide medical checkup services to Nepalese people going abroad on foreign employment. Majority of the medical centre is located in the Bagmati province, which includes the Capital city of Nepal, i.e., Kathmandu. Around 10% of medical centres in Koshi Province and Karnali province with no any medical centres. The majority of medical centers are standalone laboratory and provides only outpatients services with no Inpatient services

Table 7: The general characteristic of hospitals.

S.N	Name of Hospital	Province	Category of Hospital	# beds
1	Norvic International Hospital	Bagmati	Tertiary Hospital	200
2	Grande International Hospital	Bagmati	Tertiary Hospital	200
3	Ciwec Hospital Pokhara	Gandaki	Tertiary Hospital	25
4	Mediciti Hospital	Bagmati	Tertiary Hospital	700
5	Neuro Hospital (National Institute of Neurology)	Bagmati	Tertiary Hospital	100
6	Manipal College of Medical Science	Bagmati	Tertiary Hospital	700
7	CIWEC Clinic	Bagmati	Tertiary Hospital	25
	IOM Nepal Migration Health Assessment Center	Bagmati	Tertiary Hospital	0

The above listed hospitals are tertiary hospitals best known for health screening for foreign migration and travelers in Nepal. These all the multi-specialty hospitals.

Conclusion

A large proportion of the youth population is migrating to overseas work every day in Nepal. The existing national health system does not have any functional link to occupational health services delivery. The management of occupational illness and disease is treated as general health services. There is no specific

health structure to manage occupational illnesses. The Ministry of Labor, Employment, and Social Security is the apex body for national Occupational Safety & Health in Nepal. OSH seems a less priority area for the Ministry of Labor, Employment, and Social Security. Due to a lack of priority, the institutional structure for OSH supervision and administration seems weak with a severe lack of human resources. There is no functional linkage between MOHP. There are no specific measures in place to ensure the standardization of health examination for occupational diseases. There are no specific medical examination schemes for workers exposed to hazardous substances, including asbestos. There is no standard for diagnostic tools such as radiographs, used in the occupational disease investigation. The regulatory bodies that contribute to quality assurance in occupational health services are limited to workplace measurement and worker health examination. A migrant worker must get a pre-screening medical checkup for the visa application. In the case of migrant workers, they must get pre-screening medical checkups from the government-approved health institution recognized by the Ministry of Health and Population, Nepal. The occupational health service delivery system in Nepal is limited to pre-screening for labour migrants and workplace measurement and screening activities

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令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

健康管理手帳制度の国際展開に向けた米国の健康診断実施状況調査

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研究要旨

【目的】

多くの移民を受け入れている先進諸国において、外国人労働者の帰国後のフォローアップをどのように行なっているのかについて、米国を対象に調査を行った。

【方法】

米国大学２校を訪問し、産業保健の専門家に対して、米国における退職後の健康診断の現状について情報収集を行った。

【結果】

訪問先１では、米国の労災補償制度や特定の健康リスクに焦点を当てた報告が行われた。労災補償は州ごとに異なり、特に外国人労働者の補償情報は多様性がある。特定の疾患に関する情報の集約が不足しており、退職後の補償が不十分であることが指摘された。訪問先２では、国際的な健康管理手帳制度の実施に関する課題やベリリウム曝露などの補償問題についての新たな情報が提供された。異なる国での調査の複雑さや個人情報の保護に関するアドバイスも共有された。

【考察】

先進国である米国は世界各地からの移民を受け入れており、その規模は日本の外国人労働者の 10 倍以上に及ぶ。しかし、帰国後のフォローアップ体制が整備されておらず、退職後のフォローアップも不十分である現状が浮かび上がった。したがって、本事業は前例のない画期的な取組であり、AI 技術の進歩により言語の壁を超えやすくなった今後の国際社会においても意義があるものと言える。

A. 研究目的

本事業では、現在多くの技能実習生が来日しているベトナム、中国、フィリピン、インドネシアを中心に健康管理手帳制度に基づく健康診断を行う適切な医療機関等の把握、健康診断の実施方法・課

題等についての文献調査を進めている。一方で、多くの移民を受け入れている先進諸国において、外国人労働者の帰国後のフォローアップをどのように行なっているのかについて、事例を収集することも本事業を推進する上で意義深いことである。本研究では、米国を対象として調査を行った。

B. 研究方法

米国大学２校（UCSF, University of Arizona）を訪問し、産業保健の専門家を対象に、米国における退職後の健康診断の現状について情報収集を行った。

【訪問先 1】
日時：2024 年 3 月 26 日
場所：
Division of Occupational Environment and Climate Medicine (OECM)University of California, San Francisco
会議出席者：
Gina Solomon MD, MPH Division Chief
John Balmes MD Professor Emeritus
Paul Blanc MD, MSPH Professor Emeritus
Bob Kosnik MD, DIH
Bob Harrison MD, MPH
Matt Gribble PhD. DABT Associate Chief for Research
Brian Graham MD Chief of Pulmonary and Critical Care Medicine, Zuckerberg San Francisco General Hospital
菅沼成文　高知大学医学部環境医学教室教授
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安光ラヴェル香保子　高知大学医学部環境医学教室

【訪問先 2】
日時：2024 年 3 月 27 日
場所：
Mel & Enid Zukerman College of Public Health, University of Arizona
会議出席者：
Philip Harber MD, MPH Adjunct Professor
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C. 研究結果

訪問先１：
菅沼より「健康管理手帳制度による健康診断の諸外国での実施のための研究」に関する概略を説明し、米国の労災（主に職業性呼吸器疾患）補償の現状についてヒアリングを実施した。

労働災害に対する補償については、米国は日本より遅れており、退職後長期にわたる補償はほとんどなく、また、労働者への補償に関する法律は州ごとであるため、数例を除いては、全国統一のサーベイランスプログラムは存在せず、労災の情報が散在している状態である。基本的に、連邦政府の法律の下に州ごとの法律があり、カリフォルニアは連邦政府よりさらに厳しい（＝労災に関しては進んでいる）州であるが、外国人労働者については、H1B ビザを持つ高スキルの労働者から不法滞在労働者まで幅広く、その労災補償の情報は多様である。また、退職者が週を跨いで移動した場合にはさらにフォローアップが難しくなる。

アスベスト曝露については、複数の集団訴訟によって補償されることとなり、特に軍艦の修理に伴う曝露において補償体制が整備されているが、全国レベルでのデータは無い。炭鉱労働者の補償体制もあるが全米の体制ではなく、地域レベルでの補償となっている。シリカ曝露については、キッチンカウンター資材としての需要の増大にも関わらず、小規模の非公式な企業や違法労働者が多く携わっていることから補償体制が未整備で、UCSF でもシリカ曝露に関する助成金を得て調査が開始されたところである。

そのほか、カリフォルニア州セントラル・バレーの収監所の囚人や刑務官の間で、シリカおよび Coccidiodes 真菌曝露の問題が増加している。

米国では、粉塵暴露による塵肺が発現して初めて、患者は公的な医療記録を所持し、補償を受けることとなる。塵肺についてのスクリーニングは、胸部 X 線のみで CT は基本的には使用されていない。

核施設（電力・兵器）でのベリリウム曝露については、政府が検査を実施し、感作があった場合には、医療サーベイランスを受ける権利が生じる。

退役軍人については、退役軍人のための病院（UCSF にも存在）は、スクリーニングを提供する義務を要するが、退役軍人にスクリーニングを受ける義務はない（＝退役軍人から声を上げない限りスクリーニングは実施していない）。

最後に、トヨタのような多国籍企業における労災に対する退職後の補償について、参考になる情報がある可能性が指摘された。

訪問先２：

菅沼より「健康管理手帳制度による健康診断の諸外国での実施のための研究」に関する概略を説明。全米の現状についても前会議同様の内容について説明があった。新たな情報としては、

UCSF で説明があった通り、核兵器産業でのベリリウム曝露については国レベルでの補償がある炭鉱労働者については補償制度はあるものの参加率が低い。その主な理由としては、補償を受けるこ

とでその後の収入が下がる可能性があること、死後に肺の検体を提出する必要があることなどが考えられる。退役軍人への補償については、イラク戦争後にコホート調査が始まった（例：Millennium cohort, Depleted uranium cohort）ウランとシリカの職業曝露は、ネイティブアメリカンが多い。近年、新しいシステムの導入により、各州において死亡情報を個人情報と繋げる試みが始まっている。Harber 教授のヨーロッパでの国を跨いだ調査の経験をもとに、本調査実施にあたり以下の助言があった。

- 異なる言語・文化などのため、一見単純に思える質問票調査ですらも困難になる可能性
- 情報収集にあたり、個人情報を別の国に移すことも困難
- ガイドラインの必要性（例：ベトナムなど他国の医師向けの診断に関するガイドライン）
- 読影者が異なる場合の目合わせの必要性
- 胸部 X 線と呼吸機能テストを組み合わせて実施
- Email アドレスは比較的追跡が容易ではあるが、最も良いのは指紋など生体認証
- 個人情報保護の一つの方法として Honest broker の活用
- 診断に関わる医師も放射線医師・内科医・産業医など多岐にわたる場合も想定する必要有

D. 考察

先進国の一つである米国は、英国、アイルランド、ドイツ、イタリア等の欧州を初め、アフリカ、中南米、アジアなど、世界各地からの移民を受け入れてきた歴史を持つ。移民はそのまま米国社会に定住・不法滞在するか、母国に帰るが、1990 年には既に 2000 万人と日本の外国人労働者の規模の 10 倍に及んでいることからも推察されるように、帰国後のフォローアップ体制は整備されていないどころか、国内での退職後のフォローアップもままならないのが現状であるという事実が浮かび上がってきた。このことからも、本事業が検討する取組は前例のない画期的な取組であり、AI 技術等の進歩により言語の違いを超えやすくなった今後の国際社会においても意義のある取組であることが窺える。

E. 結論

訪問先１と２の報告では、米国の労災補償制度や健康リスクに焦点を当て、補償の不足や国際的な課題が浮き彫りになった。異なる国での調査の複雑さも指摘され、個人情報の保護についてのアドバイスも共有された。これらの洞察は、労働者の健康と補償制度の改善に向けた重要な一歩となる。

F. 健康危険情報

該当なし

G. 研究発表

該当なし

H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得

該当なし

2. 実用新案登録

該当なし

令和 5 年度労災疾病臨床研究事業費補助金研究　分担研究報告書

アジアじん肺読影医養成プログラム（AIR Pneumo）認定医の分布状況

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研究要旨

【目的】

本研究の目的は、2008 年から 2023 年までの Asian Intensive Reader of Pneumoconiosis (AIR Pneumo)プログラムに参加した医師の出身国の分布を調べ、AIR Pneumo 試験の成績をまとめて、合格者と不合格者の X 線写真の読影の違いについて述べることである。

【方法】

本研究では、2008 年から 2023 年までに Asian Intensive Reader of Pneumoconiosis (AIR Pneumo)プログラムにより実施された認定試験への医師の参加状況と認定試験の成績を調べ、試験に合格した医師と不合格となった医師の読影結果を比較した。

【結果】

2023 年 12 月までに、20 カ国から 674 人の医師が認定試験を受けており、特に近年は参加者が増加している。参加者の人口統計、参加傾向、合否率、習熟度スコアをまとめ、試験に合格した医師と不合格だった医師のじん肺の X 線写真の読影の違いを評価した。背景となる専門医の専門分野、職務経験は様々であった。合格率と合格者の平均技能スコアは初回の認定試験で 83.4%と 77.6±9.4、再認定試験で 76.8%と 88.1±4.5 であった。試験に合格した医師と比較して、不合格となった医師は、正答では陰性の胸部 X 線写真を陽性と分類し、陰影密度を正答よりも高めに読む傾向があった。また、大きな空孔や胸膜斑を見逃す可能性が高く、小さな空孔の形状を認識する精度が低かった。

【考察】

本研究結果から、不合格となった医師は胸部 X 線写真をじん肺陽性と過剰診断する傾向があり、小陰影の形状を正確に同定することが困難であることが示唆された。

A. 研究目的

じん肺の健康管理のためには、働く労働者に対するじん肺健康診断が重要となる。この健康管理には、国際労働機関が定める国際じん肺 X 線分類（ILO Internatiional Classification of Radiograph of Pneumoconioses）が用いられる。

本研究では、研究代表者らを始めとした日本人専門家らが中心となって、アジア諸国で国際じん肺 X 線分類を用いて読影医を養成する取り組みとして、アジアじん肺読影医養成プログラム（AIR Pneumo）を通じて養成した認定医を、診断・治療に関して一定の技術レベルに達していると思われる者とみなし、その分布状況を調べた。

B. 研究方法

AIR Pneumo 検査は、胸部 X 線写真を分類する医師の熟練度を評価するものであり、医師の正確性と一貫性を評価するために、小空孔、大空孔、胸膜斑の分類が行われる。精度は感度と特異度を用いて測定され、スコアはそれらの組み合わせで計算される。また、専門家パネルとの一致率も評価される。医師の情報が収集され、試験への参加と成績の分析が行われ、合格率や不合格率、平均点などが報告され、医師間の比較も行われる。すべての解析は Stata/MP 17.0 ソフトウェアを用いて行われ、倫理委員会の承認を得ている。

C. 研究結果

2008 年から 2023 年にかけて、AIR Pneumo は 26 回の認定試験をインド、フィリピン、ベトナム、インドネシア、ブラジル、日本、タイで実施した。認定試験には 674 人の医師が参加し、その 6 割はインドネシア、タイの医師であった。認定試験の合格率は 83.4%であり、再認定試験の合格率は 76.8%だった。合格した医師は、再認定試験を受けた医師を除いて、小空孔の同定で偽陽性が偽陰性よりも多い傾向があった。不合格となった医師は、病変の同定における偽陽性率および偽陰性率が高かった。また、profusion の分類では専門家パネルとの比較で有意な違いがあった。認定試験と再認定試験の両方で、合格した医師は小さな混濁の形状を正しく認識する割合が高かったことが示された。

表 1. 2008~2023 年に実施した AIR Pneumo の認定試験に関する情報

国	試験開催頻度
インドネシア	6
タイ	7
インド	1
ベトナム	1
日本	5
ブラジル	5
フィリピン	1

表 2. 2008~2023 年に AIR Pneumo の認定試験を受けた 674 人の医師に関する情報

医師の基本属性	人数 (%)
国	
インドネシア	218 (32.3)
タイ	186 (27.6)
インド	58 (8.6)
ベトナム	56 (8.3)
日本	49 (7.3)
ブラジル†	48 (7.1)
フィリピン	23 (3.4)
マレーシア	22 (3.3)
その他‡	13 (1.9)
不明	1 (0.2)
専門分野	
産業医	195 (28.9)
呼吸器内科医	187 (27.7)
放射線科医	117 (17.4)
総合診療医	59 (8.8)
公衆衛生	27 (4.0)
その他	4 (0.6)
不明	85 (12.6)
性別	
女性	304 (45.1)
男性	282 (41.8)
不明	88 (13.1)
卒後年数	
中央値 (範囲)	10 (1–41)
≤5	173 (25.7)
6-10	129 (19.1)
≥11	240 (35.6)
不明	132 (19.6)
過去のじん肺胸部X線写真の読影件数（枚）	
なし	144 (21.4)
<10	248 (36.8)
<50	103 (15.3)
≥50	97 (14.4)
不明	82 (12.2)

†アルゼンチン、チリ、ペルーの医師を含む。
‡ブルネイ、カンボジア、香港、ブータン王国、ラオス、モンゴル、台湾の医師を含む。

D. 考察

本研究では、2008 年から 2023 年までの AIR Pneumo 試験の成績を総括し、合格者と不合格者の X 線写真の読影の違いを評価した。約 20 カ国から計 674 人の医師が参加し、多くは ASEAN 諸国出身で呼吸器内科医、産業医、放射線科医のバックグラウンドを持っていた。AIR Pneumo への参加者数の増加は、発展途上国の医師の ILO 分類システムへの関心の高まりを示している。しかし、再認定試験への参加率が低いことから、医師は主に ILO 分類システムの理解やじん肺に関する知識向上に関心を持っている可能性がある。さらに、一部の国からの参加率が低いことから、じん肺の X 線写真の読影と報告の資格に関する具体的な規制の重要性が浮かび上がる。不合格となった医師は、合格者に比べて X 線写真をじん肺陽性と誤って分類する割合が高く、特に小さな混濁を多く読み取る傾向があった。これらの結果は、今後のトレーニングプログラムの改善の必要性を示している。具体的には、医師の肺結核の初期の X 線変化や大きな混濁、胸膜斑を認識し、小さな混濁を分類する能力の向上に焦点を当てる必要がある。また、ウェブベースのトレーニングプログラムの開発や医療用のフラットパネル診断モニターへのアクセスの確保など、新しい技術やリソースに適応する必要がある。

E. 結論

アジア諸国におけるじん肺の X 線診断においては、読影医の訓練プログラムの改善が急務である。特に肺結核や巨大線維化の診断に対する医師の能力向上が重要である。新技術への適応も必要であり、ウェブベースのトレーニングプログラムの開発が進んでいる。ただし、トレーニングプログラムの効果やウェブベースアプローチの他国での適用性については、さらなる検討が必要だろう。

F. 健康危険情報

該当なし

G. 研究発表

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H. 知的財産権の出願・登録状況(予定を含む)

1. 特許取得
該当なし
2. 実用新案登録
該当なし

Industrial Health 2024, **62**, 143–152

Field Report

Asian Intensive Reader of Pneumoconiosis program: examination for certification during 2008–2020

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Abstract: This study examined physicians' participation and performance in the examinations administered by the Asian Intensive Reader of Pneumoconiosis (AIR Pneumo) program from 2008 to 2020 and compared radiograph readings of physicians who passed with those who failed the examinations. Demography of the participants, participation trends, pass/fail rates, and proficiency scores were summarized; differences in reading the radiographs for pneumoconiosis of physicians who passed the examinations and those who failed were evaluated. By December 2020, 555 physicians from 20 countries had taken certification examinations; the number of participants increased in recent years. Reported background specialty training and work experience varied widely. Passing rate and mean proficiency score for participants who passed were 83.4% and 77.6 ± 9.4 in certification, and 76.8% and 88.1 ± 4.5 in recertification examinations. Compared with physicians who

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passed the examinations, physicians who failed tended to classify test radiographs as positive for pneumoconiosis and read a higher profusion; they likely missed large opacities and pleural plaques and had a lower accuracy in recognizing the shape of small opacities. Findings suggest that physicians who failed the examination tend to over-diagnose radiographs as positive for pneumoconiosis with higher profusion and have difficulty in correctly identifying small opacity shape.

Key words: Asian Intensive Reader of Pneumoconiosis (AIR Pneumo), Chest radiograph, International Labour Office (ILO), Occupational health, Pneumoconiosis, Surveillance

Introduction

Pneumoconiosis is an occupational lung disease caused by inhaling mineral dust, such as coal mine dust, silica, and asbestos. It appears as widely distributed nodular or reticular lesions on a chest radiograph. In 2017, there were approximately 60,055 newly diagnosed cases globally, with over half occurring in Asia (32,205 in China and 5,160 in India)[1]. The risk of exposure to harmful substances increases due to industrialization and the transfer of hazardous processes, such as asbestos processing and ship breaking to developing countries[2–4]. Early detection through health surveillance programs is crucial[5]. However, implementing such programs can be particularly challenging in developing countries due to limited resources, a lack of experienced physicians skilled in reading chest radiographs, and various obstacles, including a lack of awareness of pneumoconiosis, poor cooperation from industries, and a lack of policy environment.

Interpreting the radiographic signs of pneumoconiosis is challenging due to subjectivity and inconsistency among readers. To ensure uniform reporting, the International Labour Office (ILO) developed the ILO International Classification of Radiographs of Pneumoconioses (ILO classification system) in 1950[6]. The ILO classification system uses standardized descriptions, guidelines, and reference radiographs. It classifies radiographic abnormalities into small opacities, large opacities (opacities larger than 1 cm), and pleural abnormalities. Small opacities are further defined as rounded or irregular shapes and categorized based on profusion using a twelve-subcategory scale within four major profusion categories ranging from 0 to 3. Large opacities are encoded as *A, B*, or *C* in increasing order of sizes. Pleural abnormalities are classified as pleural plaques, costophrenic angle obliteration, and diffuse pleural thickening. This system allows readers to report pneumoconiosis using identical descriptions of parenchymal and pleural findings.

However, disagreements persist due to unfamiliarity with the ILO classification system and radiographic manifestations of pneumoconiosis[7]. To address this, the National Institute for Occupational Safety and Health introduced the B Reader certification program in the United States in 1974[8, 9]. In 2006, a similar initiative called the Asian Intensive Reader of Pneumoconiosis (AIR Pneumo) project was established[10]. This project, in collaboration with various institutions and organizations (see the acknowledgment), focuses on providing training and certification programs to occupational health physicians in developing countries. The main goal of the project is to improve their proficiency in utilizing the ILO classification system for classifying and interpreting radiographic findings associated with pneumoconiosis.

Since 2008, AIR Pneumo has been conducting training programs in Thailand, and in 2018, it expanded its reach to Indonesia. The program also provides training upon invitation from governmental agencies of hosting countries. In South America, in collaboration with the ILO, AIR Pneumo has been offering the program as a national training course in Brazil since 2009. These programs contribute to strengthening national systems for workers' health surveillance.

The AIR Pneumo program includes a two-day training course and a three-hour examination, during which physicians classify 60 chest radiographs according to the ILO classification system. To obtain AIR Pneumo-Reader certification, physicians must achieve a score of 60 or higher out of 100. After five years, certified readers are required to take a recertification examination, using the same test radiographs as the initial certification. A score of 80 or higher is required to pass the recertification and demonstrate improvement. However, maintaining AIR Pneumo-Reader status only necessitates a score of 60 or higher. Further details of the AIR Pneumo project have been reported elsewhere[10–12]. This study aims to summarize physician participation and performance in AIR

Pneumo examinations from 2008 to 2020 and describe the differences in reading radiographs between those who passed and those who failed the examinations.

Subjects and Methods

The AIR Pneumo examination evaluates physicians' proficiency in classifying 60 chest radiographs according to the ILO classification system. A detailed assessment method has been previously reported[12]. In summary, physicians are assessed on their accuracy in classifying the presence or absence of small opacities, large opacities, and pleural plaques, as well as their consistency in classifying the profusion and shape of small opacities. Accuracy is measured using sensitivity and specificity, and the score is calculated as (Sensitivity + Specificity) − 1. Consistency in profusion classification and shape recognition is determined by comparing the percentage agreement with the expert panel's readings. The expert panel consists of 12 B Readers who are recognized experts in the field. They determine the correct answers for each test radiograph. The set of 60 radiographs used in the examination includes 20 without nodular or reticular lesions, 9 boundary cases (which fall into the ILO profusion subcategory 0/1 or 1/0), and 31 radiographs with small opacities (ILO profusion subcategory 1/1 or greater). Among the radiographs with small opacities, 20 have pure rounded opacities, while 4 have pure irregular opacities. Of the 31 radiographs with small opacities, 9 also display varying sizes of large opacities. Additionally, 9 of the test radiographs exhibit pleural plaques.

Since the first certification examination in December 2008, physicians' information, such as country of residence, specialty, years after graduation, and the number of reviewed pneumoconiosis chest radiographs, has been collected through a questionnaire. This information, along with physicians' reading records and test scores, has been maintained in the AIR Pneumo database. By December 2020, the database contained 652 records for 555 physicians who participated in the examinations, including 565 certification records and 87 recertification records. Ten physicians attempted the certification examination twice. For the analysis of participation and performance in the certification examination, 12 physicians who had not classify six or more of the test radiographs (*i.e.,* ≥10% of the total radiographs) in their first attempt were excluded, resulting in 543 physicians included in the analysis. For assessing participation and performance in the recertification examination, records of 69 physicians who took the test for the first time were used.

Using the collected data, first, we observed the trend in taking the examinations from December 2008 to December 2020 and physicians' participation based on their characteristics. We also summarized their performance by examination type (certification or recertification) and pass or fail status. Pass and fail rates, as well as mean scores (with standard deviation), were presented for each component of proficiency assessment, including accuracy in identifying small opacities, large opacities, pleural plaques, and consistency in classifying the profusion and shape of small opacities. Second, we compared physicians who passed and failed the examinations in the following reading assessments: (1) Rates of false positives and false negatives in classifying radiographs for small opacities, large opacities, and pleural plaques. The rates were determined based on sensitivity and specificity in classifying the lesions. (2) Assessment of over-reading or under-reading the profusion of small opacities by comparing with the expert panel's classification. To determine the profusion category for a group of physicians, we analyzed the most frequently reported profusion category by the physicians in that group. (3) Evaluation of small opacity shape recognition by calculating the percentage of physicians with similar descriptions for shape (no small opacities, rounded shape, or irregular shape). The percentage was based on radiographs containing specific shapes (4 with pure irregular opacities and 20 with pure rounded opacities). Comparisons between physicians' groups were performed appropriately using Student's *t*-test or χ^2 test. Results are presented separately for the pass or fail and for the certification or recertification examination. All analyses were performed using Stata/MP 17.0 software (StataCorp., College Station, TX, USA). This study was approved by the institutional review board of Kochi Medical School (approval number: 31-68). Due to the nature of this study, *i.e.,* using anonymized data from radiograph reading tests, the noninvasive nature of data collection, and no involvement of biological materials, written informed consent from the physicians taking AIR Pneumo examinations was waived.

Results

Between 2008 and 2020, AIR Pneumo conducted certification examinations 23 times in several countries: once in India, the Philippines, and Vietnam; four times in Indonesia; five times each in Brazil and Japan; and six times in Thailand. Figure 1 illustrates the trend and number of physicians who took the certification and recertification

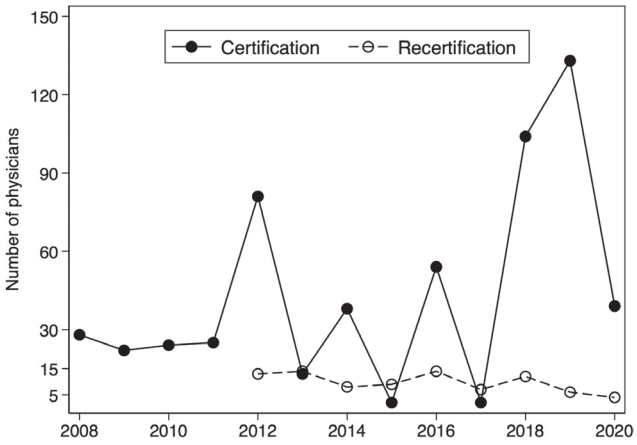

Fig. 1. Number of physicians taking certification examination and recertification examination, 2008–2020.

examinations during the study period. The number of physicians taking the certification examination fluctuated every other year until 2017. In 2018 and 2019, the participation reached its peak, with over 100 physicians taking the examination. On the other hand, the number of physicians taking the recertification remained below 15 throughout the entire period. Table 1 provides a summary information regarding the participating physicians. Over the course of twelve years, physicians from 15 Asian countries, 4 South American countries, and DR Congo took the examination. Indonesia had the highest participation rate at 31.1%, followed by Thailand (22.5%), Vietnam (10.3%), India (9.6%), Japan (9%), and Brazil (8.7%). The reported medical specialties of the participating physicians, in decreasing order of participation, included pulmonary medicine, occupational medicine, radiology, general medicine, and public health. The working duration since medical graduation ranged from 1 to 41 yr. Twenty-one percent of the physicians reported they had never encountered a pneumoconiosis chest radiograph. Table 2 presents the pass and fail rates, as well as the mean scores for the total proficiency assessment and each component, in the certification and recertification examinations. Throughout the study period, the passing rate for the certification examination was 83.4% (453 out of 543), while the recertification examination had a passing rate of 76.8% (53 out of 69). The mean total score for those who passed the certification and recertification was 77.6 ± 9.4 and 88.1 ± 4.5, respectively. Physicians who failed the certification examination scored considerably lower than 60% of the maximum possible score in consistency of classifying profusion of small opacities (mean score: 11.0 out of 25 points), accuracy in identifying small opacities (mean score: 14.9 out of 30 points), and pleural plaques (mean score: 5.7 out of 15 points). Physicians who failed the recertification examination achieved comparable scores to those who passed the certification examination, except for slightly lower scores in accuracy of identifying small opacities (mean score: 21.4 versus 25.0) and consistency of classifying profusion of small opacities (mean score: 13.5 versus 16.1).

Table 1. Information on 543 physicians taking AIR Pneumo examination, 2008–2020

Physicians' characteristics	Number (%)
Residing country	
Indonesia	169 (31.1)
Thailand	122 (22.5)
Vietnam	56 (10.3)
India	52 (9.6)
Japan	49 (9.0)
Brazil[†]	47 (8.7)
Philippines	23 (4.2)
Malaysia	15 (2.8)
Others[‡]	10 (1.8)
Specialty	
Pulmonology	164 (30.2)
Occupational medicine	147 (27.1)
Radiology	101 (18.6)
General medicine	55 (10.1)
Public health	20 (3.7)
Others	4 (0.7)
Not reported	52 (9.6)
Sex	
Female	251 (46.2)
Male	237 (43.7)
Not reported	55 (10.1)
Time since graduation, yr	
Median (range)	10 (1–41)
≤5	129 (23.8)
6–10	112 (20.6)
≥11	222 (40.9)
Not reported	80 (14.7)
Number of reviewed pneumoconiosis chest radiograph in the past	
None	114 (21.0)
<10 films	194 (35.7)
<50 films	90 (16.6)
≥50 films	95 (17.5)
Not reported	50 (9.2)

[†]including physicians from Argentina, Chile, and Peru.
[‡]including physicians from Brunei, Cambodia, People's Republic of China, DR Congo, Hong Kong, Kingdom of Bhutan, Myanmar, Parkistan, Taiwan.
AIR Pneumo: Asian Intensive Reader of Pneumoconiosis.

Table 2. Pass and fail rates and proficiency score, according to type of examination, 2008–2020

Pass and fail rate % (number of physicians)		Certification (n=543)		Recertification (n=69)	
		Pass 83.4% (453)	Fail 16.6% (90)	Pass 76.8% (53)	Fail 23.2% (16)
Assessment areas	Max score	Proficiency score (Mean ± standard deviation)			
Small opacity					
Accuracy in identifying small opacity†	30	25.0 ± 4.1	14.9 ± 4.9	28.3 ± 1.9	21.4 ± 5.8
Consistency in classifying profusion‡	25	16.1 ± 3.5	11.0 ± 2.7	18.8 ± 2.4	13.5 ± 3.6
Consistency in classifying shape‡	15	12.6 ± 1.9	9.4 ± 2.7	13.7 ± 1.0	12.1 ± 1.6
Large opacity					
Accuracy in identifying large opacity†	15	13.5 ± 1.7	9.9 ± 3.5	14.3 ± 0.8	12.6 ± 2.0
Pleural plaque					
Accuracy in identifying pleural plaque†	15	10.4 ± 3.1	5.7 ± 3.1	13.0 ± 1.6	10.1 ± 2.5
Total score	100	77.6 ± 9.4	51.0 ± 7.6	88.1 ± 4.5	69.6 ± 8.4

Max score, maximum possible score. Passing score in the examination is 60 for certification and 80 for recertification. †Accuracy scores are calculated by the formula: (sensitivity + specificity) − 1. ‡Consistency scores are calculated as percentage agreement with the readings of a panel of 12 B Readers.

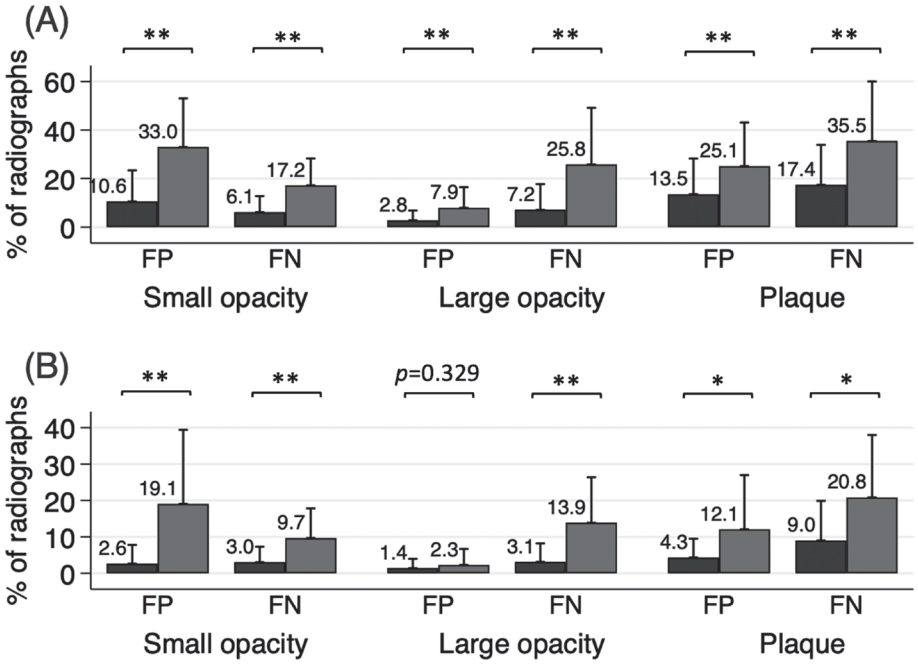

Fig. 2. False-positive (FP) and false-negative (FN) rates in classifying pneumoconiosis, stratified according to pass (black bar) or fail (gray bar) status in (A) certification examination and (B) recertification examination. Group comparisons were performed using Student's *t*-test; **p*<0.01; ***p*<0.001. Error bars represent standard deviations. The ILO International Classification of Radiographs of Pneumoconioses defines parenchymal abnormalities as small opacities (opacities with diameters up to 1 cm) or large opacities (opacities larger than 1 cm) and pleural abnormalities as localized plaques or diffuse pleural thickening (abnormalities extending up the lateral chest wall with involvement of obliterated costophrenic angle).

Figure 2 (A) and 2 (B) display the false-positive and false-negative rates in classifying radiographs for parenchymal and pleural lesions among physicians who passed and failed the certification and recertification examinations, respectively. The figures indicate that false positives are more common than false negatives in identifying small opacities among physicians (except for physicians who passed the recertification examination), while the

opposite pattern is observed for identifying large opacities and pleural plaques. Compared to physicians who passed the examination, physicians who failed had significantly higher false-positive and false-negative rates in identifying the lesions (except for the false-positive rate in identifying large opacities among physicians taking recertification examinations). Figure 3 (A) and 3 (B), respectively for the certification and recertification examinations, demonstrate an over-reading/under-reading tendency among physicians in classifying small opacity profusion. The figures indicate that physicians tend to read higher profusion, particularly those who failed the examination. Compared with true profusion classified by the expert panel, the classifications of physicians' groups were significantly different: χ^2 (9)=98.5, p<0.001 and χ^2 (9)=78.2, p<0.001 for physicians who passed and failed the certification examinations, respectively; and χ^2 (9)=106.2, p<0.001 and χ^2 (9)=83.8, p<0.001 for physicians who passed and failed the recertification examinations, respectively. Table 3 presents the recognition of small opacity shape by the physicians who passed and failed the examinations. The percentage of physicians who correctly recognized the shape of small opacities was higher among physicians who passed the examination than those who failed, and when the radiographs contained rounded opacities compared with irregular opacities.

Discussion

In the present study, we summarized the AIR Pneumo examinations conducted between 2008 and 2020 and evaluated the differences in radiograph readings between physicians who passed and those who failed the examination. During this twelve-year period, a total of 555 physicians from approximately 20 countries participated in the examination. Most physicians were from ASEAN countries and had background training in pulmonology, occupational medicine, or radiology. The increasing number of participants in the recent AIR Pneumo programs indicates

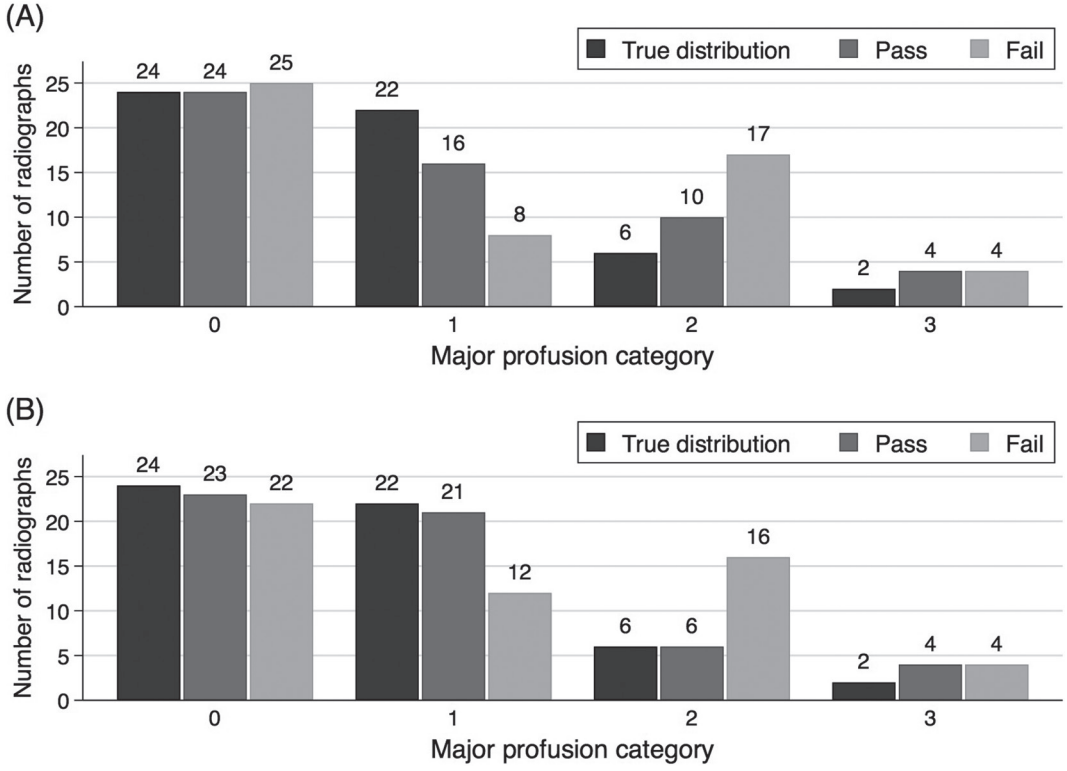

Fig. 3. Distribution of classifications for small opacity profusion of 54 test radiographs, stratified according to pass or fail status in (A) certification examination and (B) recertification examination. True distribution=classified by expert panel of 12 B Readers. To determine the profusion category for a group of physicians, we analyzed the most frequently reported profusion category by the physicians in that group. The profusion classified by physicians' groups was significantly different from the true profusion; p<0.001 for all χ^2 tests. The ILO International Classification of Radiographs of Pneumoconioses utilizes four major profusion categories, ranging from 0 to 3, indicating the increasing concentration of small opacities (opacities with diameters up to 1 cm).

Table 3. Proportion of physicians according to their classifications of the shape of small opacities

Shape of small opacity in the radiographs	Certification		Recertification	
	Pass (n=453)	Fail (n=90)	Pass (n=53)	Fail (n=16)
	% of physicians (95% Confidence interval)			
Pure irregular opacity (4 radiographs)				
Negative†	14.0 (12.4–15.6)	24.9 (20.4–29.5)	8.1 (4.4–11.8)	4.7 (0.5–9.9)
Rounded‡	15.1 (13.4–16.7)	30.4 (25.6–35.3)	9.5 (5.6–13.5)	14.1 (5.5–22.6)
Irregular§	70.9 (68.8–73.0)	44.6 (39.4–49.9)	82.4 (77.2–87.5)	81.3 (71.7–90.8)
Pure rounded opacity (20 radiographs)				
Negative†	2.1 (1.8–2.3)	8.1 (6.9–9.4)	1.8 (1.0–2.6)	2.8 (1.0–4.6)
Rounded‡	87.5 (86.8–88.2)	68.5 (66.3–70.6)	92.7 (91.1–94.3)	87.8 (84.2–91.4)
Irregular§	10.5 (9.8–11.1)	23.4 (21.4–25.4)	5.5 (4.1–6.9)	9.4 (6.2–12.6)

% of physicians for a given group was the average for radiographs containing a particular shape of small opacities (*i.e.,* 4 radiographs with pure irregular opacity and 20 with pure rounded opacity). Physicians classified the radiographs as: †having no small opacities in the radiograph; ‡the presence of rounded opacities; §the presence of irregular opacities.

a growing interest among physicians from developing countries in using the ILO classification system. However, the low rate of participation in the recertification examination suggests that physicians are primarily interested in understanding the ILO classification system or improving their knowledge of pneumoconiosis. Furthermore, the low participation from some countries highlights the importance of specific regulations regarding qualifications for reading and reporting radiographs for pneumoconiosis. To prioritize workers' health, developing countries like those in the ASEAN should establish comprehensive legal frameworks, similar to those in Japan[13] and the United States[14], to ensure the comprehensive provision of health services for workers exposed to dust.

The ability to distinguish the presence or absence of small opacities consistent with pneumoconiosis on a chest radiograph is crucial for screening, epidemiological data, and legal processes, and this skill is examined in AIR Pneumo. Physicians who failed the examination classified substantially more radiographs as the presence of pneumoconiosis than physicians who passed. Specifically, physicians who failed the certification and recertification examination incorrectly classified 33% and 19.1% of normal radiographs as positive for pneumoconiosis, respectively, while the corresponding figures for physicians who passed were 10.6% and 2.6%. In addition, physicians who failed tended to read a higher small opacity profusion than physicians who passed. Similar findings of higher false-positive rates for pneumoconiosis were reported among physicians who failed the B Reader examination[8]. Although the technical quality of the radiographs may influence the reading, this was not the case in the present study. The expert panel graded all radiographs used in the AIR Pneumo examination as ILO grade 1 (Good) or grade 2 (Acceptable, with no technical defect likely to impair the classification of the radiograph for pneumoconiosis). One possible explanation for the overreading of pneumoconiosis is the different thresholds among physicians for distinguishing between normal and abnormal chest radiographs. It was also likely that less experienced readers interpreted increased lung markings, for example, those commonly seen in the chest radiographs of heavy smokers[15], as pneumoconiosis. Lack of familiarity with the ILO standard radiographs illustrating profusion of small opacities might contribute to overreading of profusion. In cases with large opacities of progressive massive fibrosis, less experienced readers might mistakenly see the fibrotic distortion of the surrounding lung as increased profusion. Chest radiograph readings play a crucial role in health surveillance for workers exposed to mineral dust and in compensation claims[13]. Recognizing early radiographic changes is essential for preventing pneumoconiosis progression in individual workers. However, falsely identifying the disease and overdiagnosing its severity can lead to substantial economic and social costs.

In the present study, compared to physicians who passed the examination, those who failed it had a higher proportion of overlooking or not recognizing large opacities and pleural plaques in test radiographs. They also failed to notice or incorrectly classified irregular-shaped small opacities. Unfamiliarity with the appearance of large opacities of progressive massive fibrosis, pleural plaques (especially face-on plaques), and irregular-shaped small opacities on a chest radiograph might be a possible reason for these findings. Pleural plaques, characterized by discrete areas of pleural thickening, can be challenging to

visualize in a posteroanterior radiograph, leading to a low detection rate in their radiographic diagnosis[16, 17]. Pleural plaques indicate past asbestos exposure, and asbestosis, which manifests as linear or reticular lesions (The ILO classification system describes as irregular opacities.), is a diffuse interstitial fibrosis associated with asbestos exposure[18]. The increasing number of asbestosis cases globally emphasizes the importance of recognizing plaques and radiographic features of asbestosis[1]. As the prognosis and management of asbestosis differ from other forms of interstitial lung diseases, such as idiopathic pulmonary fibrosis, it is crucial to identify these features. Although the association between pleural plaques and lung cancer remains inconclusive[19, 20], their presence necessitates immediate diagnostic work-up to rule out asbestos-related malignancies.

Role of AIR Pneumo and areas needing improvement

AIR Pneumo has played a crucial role in strengthening the national pneumoconiosis surveillance system in developing countries by training physicians to use the ILO classification system effectively. The acquisition of knowledge regarding the ILO classification system, particularly the standard radiographs, has shown improvements in pneumoconiosis interpretation[21]. While only a few countries[13, 22] have a similar classification system, the ILO classification system is widely accepted for reporting pneumoconiosis in surveillance programs, epidemiological studies, and compensation claims. Additionally, the screening and monitoring of pneumoconiosis among workers exposed to mineral dust, using chest radiography and reporting based on the ILO classification system, are integral components of the ILO/WHO's Global Program for the Elimination of Silicosis[23]. It is well recognized that chest radiographs alone are insufficient for clinically diagnosing parenchymal or pleural changes in pneumoconiosis, particularly in mild cases[24]. However, a recent study demonstrated that chest radiography, when compared to low-dose thin-slice computed tomography, performed adequately in classifying pneumoconiosis according to the ILO classification system, as assessed by AIR Pneumo or NIOSH-certified physicians[17]. Early identification of pneumoconiosis cases through surveillance programs is crucial for timely intervention and management. Therefore, the establishment of a national system for pneumoconiosis screening and the enhancement of diagnostic capabilities among physicians in each country are utmost importance. While certified AIR Pneumo readers currently contribute to the screening and surveillance of pneumocosis[25], further studies are required to evaluate the effectiveness of the AIR Pneumo program.

However, our data indicate the need for improvement in future training programs. First, there should be a greater emphasis on improving (1) physicians' ability to recognize and distinguish early radiographic changes of pneumoconiosis, large opacities of progressive massive fibrosis, and pleural plaques, and (2) physicians' consistency in classifying the profusion of small opacities. To achieve this, training programs can include more radiographs illustrating boundary cases (*i.e.,* ILO profusion subcategory 0/1 and 1/0) and lower profusion (for example, ILO profusion subcategory 1/1), increased training time to study the radiographic appearance of irregular opacities, large opacities of progressive massive fibrosis, and pleural plaques, and more exposure to the ILO standard radiographs illustrating profusion of small opacities. Additionally, the number of test radiographs can be increased (for example, to 80 radiographs), specifically including more radiographs containing irregular opacities, large opacities, and pleural abnormalities. Second, apart from proficiency issues, organizing a training program like AIR Pneumo involves various considerations, such as transportation of training and examination materials (*e.g.,* sets of ILO standard films, radiographs for self-practice and the test), preparation of standard view boxes, and hosting participants. Moreover, as chest radiography has transitioned to a digital environment, with the ILO extending the applicability of its classification system to digital radiographic images[26], it is important to address these developments. Additionally, the increasing participation of physicians in AIR Pneumo programs requires adapting to new technologies and overcoming previous limitations. Therefore, AIR Pneumo is developing a web-based program to facilitate training and examinations. (The training courses can be accessed via the link provided: https://kmsx.edunext.io/courses/course-v1:kmsx+AIRP101+2021_T1/about.) This web-based approach allows participants to download and study lecture videos at their convenience. Initial pilot training courses conducted in Japan using similar topics covered in on-site training have shown promising results. However, the applicability of this web-based training in other countries requires further research. Furthermore, the transition to a web-based examination presents feasibility concerns, such as ensuring participants have access to medical-grade flat-panel diagnostic monitors.

Conclusions

We conducted a study to examine the participation and performance of physicians in AIR Pneumo examinations from 2008 to 2020. The results of our study show that the number of physicians taking the initial certification test has increased in recent years. However, we also found that physicians who failed the examinations were more likely to classify radiographs as positive for pneumoconiosis and show higher small opacity profusion compared to those who passed. Furthermore, they had a tendency to overlook or not recognize pleural plaques and incorrectly classify irregular-shaped small opacities.

Despite the launch of the ILO/WHO's Global Program for the Elimination of Silicosis in 1995, which aimed to address the widespread issue of pneumoconiosis and protect workers from hazardous substances, millions of workers are still being exposed to these harmful substances, and pneumoconiosis remains prevalent in many developing countries. Since chest radiography and reporting based on the ILO classification system are the current standard in medical surveillance, research, and compensation claims related to pneumoconiosis, it is essential to make efforts to increase the number of competent physicians in developing countries who can effectively use the ILO classification system.

Authors' Contribution

All authors contributed toward data collection and reviewed and approved this manuscript. NA J-P: Writing original draft, data curation, data analysis, review & editing. NS: Writing initial draft, data curation, data analysis, review & editing. ADS: Data curation, review & editing. ES: Data curation, review & editing. MM: Data curation, review & editing. ST: Data curation, review & editing. SL: Data curation, review & editing. PS: Data curation, review & editing. SS: Data curation, review & editing. ND: Data curation, review & editing. EA: Data curation, review & editing. JEP: Data curation, review & editing. KGH: Data curation, review & editing. HK: Data curation, review & editing. TT: Data curation, review & editing. YK: Data curation, review & editing.

Disclosure

Approval of the research protocol: This study was approved by the institutional review board of Kochi Medical School (approval number: 31-68).

Informed consent: Due to the nature of this study, *i.e.,* using anonymized data from radiograph reading tests, the noninvasive nature of data collection, and no involvement of biological materials, written informed consent from the physicians taking AIR Pneumo examinations was waived.

Registry and Registration No. of the study/trial: N/A.

Animal Studies: N/A.

Conflict of interest: None declared.

Data availability: Data (in an anonymized format) are available from the corresponding author upon reasonable request.

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Original Article

Inter-observer agreement and accuracy in classifying radiographs for pneumoconiosis among Asian physicians taking AIR Pneumo certification examination

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Abstract: This study examined inter-observer agreement and diagnostic accuracy in classifying radiographs for pneumoconiosis among Asian physicians taking the AIR Pneumo examination. We compared agreement and diagnostic accuracy for parenchymal and pleural lesions across

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residing countries, specialty training, and work experience using data on 93 physicians. Physicians demonstrated fair to good agreement with kappa values 0.30 (95% CI: 0.20–0.40), 0.29 (95% CI: 0.23–0.36), 0.59 (95% CI: 0.52–0.67), and 0.65 (95% CI: 0.55–0.74) in classifying pleural plaques, small opacity shapes, small opacity profusion, and large opacities, respectively. Kappa values among Asian countries ranging from 0.25 to 0.55 (pleural plaques), 0.47 to 0.73 (small opacity profusion), and 0.55 to 0.69 (large opacity size). The median Youden's J index (interquartile range) for classifying pleural plaque, small opacity, and large opacity was 61.1 (25.5), 76.8 (29.3), and 88.9 (23.3), respectively. Radiologists and recent graduates showed superior performance than other groups regarding agreement and accuracy in classifying all types of lesions. In conclusion, Asian physicians taking the AIR Pneumo examination were better at classifying parenchymal lesions than pleural plaques using the ILO classification. The degree of agreement and accuracy was different among countries and was associated with background specialty training.

Key words: AIR Pneumo, Chest radiograph, Diagnostic accuracy, Occupational health, Pneumoconiosis, Reader agreement

Introduction

Pneumoconiosis, a diffuse lung disease caused by inhaled industrial or environmental dust, presents radiographically with multiple reticular or variable-sized nodular opacities[1]. Pleural plaque, an irregular, circumscribed area of dense, firm, fibrous tissue, usually resulting from asbestos exposure, appears radiographically as discrete areas of pleural thickening[2]. Screening for lung or pleural changes in a dust-exposed worker is performed primarily by periodic reviews of chest radiographs[3]. The detection and interpretation of the two conditions in a chest radiograph is highly subjective and reader-dependent. To standardize reports and facilitate international comparison of data, the International Labour Office developed a classification system (ILO classification)[4]. This classification system is composed of guidelines and a set of standard radiographs, exemplifying the spectrum of the disease. The ILO published the first edition in 1950 and made several revisions to clarify ambiguities in earlier editions but preserved the basic structure of the system. Since its establishment, the ILO classification is increasingly being adopted internationally for use in epidemiological research, screening, and surveillance of pneumoconiosis.

Screening and surveillance programs are very effective at detecting new cases of pneumoconiosis and also provide information about trend and burden of disease in workers exposed to mineral dust[5]. To promote the efficiency of screening programs in developing countries, the Asian Intensive Reader of Pneumoconiosis (AIR Pneumo) provides training and examination programs for raising physicians who can perform the ILO classification[6]. At the end of 2019, more than five hundred physicians had received training since the program began in 2006. The participating physicians have expertise in general medicine, occupational medicine, public health, pulmonology, and radiology. They include physicians from several developing Asian countries who were practicing in hospitals or working in corporations, government institutions and ministries. Most importantly, they have been working on pneumoconiosis screening.

Despite using the ILO classification, substantial variation in the interpretation of radiographs for pneumoconiosis exists among physicians[7, 8]. Thus, before sharing epidemiological information, it is worth understanding the extent of inter-observer agreement and diagnostic accuracy among physicians of Asian countries. Therefore, the objective of this study was to examine the degree of observer agreement, diagnostic accuracy, and possible causes for reader variability in classifying radiographs for pneumoconiosis using reading results of Asian physicians taking the AIR Pneumo examinations.

Subjects and Methods

AIR Pneumo's examination film set

The AIR Pneumo's examination film set is composed of 60 chest radiographs; the diagnosis of each radiograph was established by a panel of experts formed by 12 National Institute for Occupational Safety and Health of the United States (NIOSH) certified B Readers. The technical quality of the radiographs was classified by the 12 B Readers as ILO grade 1 (Good) or 2 (Acceptable, with no technical

defect likely to impair classification of the radiograph for pneumoconiosis)[4]. The 60-film set includes 20 radiographs with no reticular or nodular lesions, 9 boundary cases (ILO profusion classification 0/1 or 1/0), and 31 radiographs with small opacities (ILO profusion classification 1/1 or higher). Among the radiographs with small opacities, 20 have purely rounded while 4 have purely irregular opacities. Of the 31 radiographs with small opacities, 9 also have varying sizes of large opacities (opacities with the longest diameter larger than 1 cm). Nine of the 60 examination films have pleural plaques with or without calcification. Details of the AIR Pneumo's training program, development of training materials (including chest radiographs), examination, and scoring system have been published previously[9, 10].

Physicians' information and radiograph reading data

Our study used 5,580 readings of 93 physicians from the two examinations conducted in Thailand (December 2018) and Indonesia (February 2019). They had taken the examination after completing an intensive 2-day AIR Pneumo training course. Physicians' information, including residing country, specialty training, and work experience, was collected through self-administered questionnaires. During the examinations, physicians independently read the chest radiographs on a standard view box in a comfortable reading room (controllable lighting with no direct sunlight) and reported the findings on reading sheets according to the ILO classification. They were given three hours to classify 60 radiographs. Each radiograph was graded for technical quality. Small opacities were classified according to their shape (rounded or irregular), size (size up to 1.5mm, 1.5–3mm, or 3–10mm), location (upper, middle, or lower lung zones), and profusion. Profusion was determined by side-by-side comparison with ILO standard radiographs and classified on a twelve-point scale with increasing order of concentration (codify as 0/− to 3/+ within four major profusion classifications: 0, 1, 2, and 3). Large opacities were classified as size A, B, or C, corresponding to size up to 5 cm, up to right upper lung zone, or exceeding right upper lung zone. The presence or absence of pleural plaques, their extent and width if any were recorded. We extracted data on the profusion and shape classifications of small opacities. We also obtained the size classifications of large opacities and the presence or absence of pleural plaques. Classifications on the size and location of small opacities and the technical quality of radiographs were not the purpose of this study.

Statistical analysis

We grouped physicians according to their residing country, specialty training, and experiences. Considering the number of years required to develop medical experience or to enroll in specialty training, years after graduation was grouped as "5 or fewer years", "6 to 10 years", or "11 or more years". Information on the total number of reviewed pneumoconiosis chest radiographs, the participating physicians have encountered since they became physicians, was collected as "none", "less than 10", "10 to 50", or "50 or more". For small opacity profusion, we examined inter-observer agreement on four major profusion classifications as they showed a close correlation to the clinical severity of "normal," "mild," "moderate", or "severe" conditions[11]. When computing agreement on small opacity shape, we used only the data of 40 radiographs, i.e., 9 boundary cases and 31 radiographs with small opacities. For the other analyses, we used data of all 60 radiographs. We used a Stata module 'kappaetc' to compute inter-observer agreement in physicians overall and each group formed by residing country, specialty training, or experience[12]. This command can handle any number of observers and any number of categories. It calculates the agreement coefficient by averaging the observed agreement over all pairs of observers. It also provides seven prerecorded weights, suitable for any level of measurement. We computed weighted Fleiss' kappa to quantify the degree of agreement in classifying small opacity profusion and large opacity size and unweighted Fleiss' kappa for agreement on small opacity shape and the presence or absence of pleural plaques[13]. The result was interpreted values <0.2 as poor agreement, 0.21–0.4 as fair, 0.41–0.6 as moderate, 0.61–0.8 as good, and 0.81–1.0 as almost perfect agreement. Accuracy, in this study, was the ability to discriminate between normal and abnormal radiographs, i.e., the ability to classify a radiograph for the presence or absence of small opacities, large opacities, or pleural plaque; the true condition for each chest radiograph was determined based on the reading results of expert panel. Accuracy of the physicians was assessed by using only the chest radiographs that were in complete agreement for the presence or absence of small opacities, large opacities, or pleural plaque by all expert B Readers. There were 31 radiographs with and 20 radiographs without small opacities; 9 radiographs with and 41 radiographs without large opacities; 9 radiographs with and 30 radiographs without pleural plaques. A classification of 1/0 or higher profusion and any of the size classifications for large opacity by the physicians was considered as identification of small opacities

Table 1. Information of the physicians

Total	Physicians (n=93)	Country			
		1 (n=6)	2 (n=54)	3 (n=10)	4 (n=23)
	Number of physicians (%)				
Gender					
Female	50 (53.8)	2 (33.3)	32 (59.3)	5 (50.0)	11 (47.8)
Male	34 (36.6)	4 (66.7)	17 (31.5)	5 (50.0)	8 (34.8)
Missing	9 (9.7)	0	5 (9.3)	0	4 (17.4)
Specialty					
Pulmonology	40 (43.0)	0	38 (70.4)	1 (10.0)	1 (4.3)
Occupational medicine	25 (26.9)	4 (66.7)	10 (18.5)	6 (60.0)	5 (21.7)
Public health	4 (4.3)	1 (16.7)	0	2 (20.0)	1 (4.3)
Radiology	15 (16.1)	0	2 (3.7)	1 (10.0)	12 (52.2)
Missing	9 (9.7)	1 (16.7)	4 (7.4)	0	4 (17.4)
Years after graduation					
Median (range)	6 (1–34)	15 (5–30)	6 (1–34)	8.5 (4–23)	3 (1–34)
≤5	37 (39.8)	1 (16.7)	21 (38.9)	1 (10.0)	14 (60.9)
6–10	27 (29.0)	2 (33.3)	16 (29.6)	6 (60.0)	3 (13.0)
≥11	15 (16.1)	3 (50.0)	7 (13.0)	3 (30.0)	2 (8.7)
Missing	14 (15.1)	0	10 (18.5)	0	4 (17.4)
Number of reviewed pneumoconiosis CXR					
None	17 (18.3)	0	12 (22.2)	3 (30.0)	2 (8.7)
<10	41 (44.1)	2 (33.3)	27 (50.0)	3 (30.0)	9 (39.1)
<50	20 (21.5)	2 (33.3)	8 (14.8)	4 (40.0)	6 (26.1)
≥50	6 (6.4)	2 (33.3)	2 (3.7)	0	2 (8.7)
Missing	9 (9.7)	0	5 (9.3)	0	4 (17.4)

and large opacities, respectively. We examined the accuracy of each physician group by plotting receiver operating characteristic (ROC) curves and computing area under the curves (AUC) against experts' diagnosis as a reference standard. An ROC curve that plots sensitivity against 1-specificity allows visual inspection of the discriminating power, while AUC quantifies the power with a value of 1.0 representing perfect discriminatory ability and 0.5 being at chance level[14]. We used Stata's 'roccomp' command to execute ROC analysis. Assuming sensitivity and specificity are equally important in identifying each type of lesion, we calculated Youden's J index (i.e., sensitivity + specificity – 1) as a global measure of accuracy for every physician[15]; multiplying the index by one hundred generated accuracy scores. For the accuracy score for small opacity shape classification, we computed percent agreement with the reading results of expert panel. There were 20 radiographs with purely rounded and 4 with purely irregular opacities. We then compared the accuracy scores between physician groups using the Kruskal-Wallis test with Bonferroni correction for multiple comparisons. All analyses were performed using Stata/MP 15.1 software (StataCorp., College Station, TX, USA). This study was approved by the institutional review board of Kochi Medical School (approval number: 31-68). Written informed consent from the participating physicians was waived, but opt-out consent was obtained via e-mails instead.

Results

Table 1 presents information about our physicians. Information on specialty training and experiences (years after graduation and the number of reviewed pneumoconiosis chest radiographs) were not reported by some participating physicians. Physicians resided in India, Indonesia, Malaysia, and Thailand. They had expertise in occupational medicine, public health, respiratory health, and radiology. Specialties' representation was uneven between countries. Working duration since medical graduation ranged from 1 to 34 years. Eighteen percent of our physicians reported they had never seen a pneumoconiosis chest radiograph, while 44% encountered less than ten in their work.

Table 2 presents the kappa values for classifying chest radiographs by physicians overall and by the groups stud-

Table 2. Inter-observer agreement in classifying radiographs for pneumoconiosis[a]

	Small opacity profusion[b]	Small opacity shape[c]	Large opacity size[b]	Presence of pleural plaque[c]
	Fleiss' kappa coefficient (95% CI)			
Physician overall	0.59 (0.52–0.67)	0.29 (0.23–0.36)	0.65 (0.55–0.74)	0.30 (0.20–0.40)
Country				
1	0.50 (0.39–0.61)	0.18 (0.05–0.32)	0.57 (0.42–0.72)	0.34 (0.19–0.49)
2	0.59 (0.51–0.67)	0.26 (0.20–0.32)	0.66 (0.57–0.75)	0.25 (0.16–0.34)
3	0.47 (0.38–0.55)	0.21 (0.13–0.30)	0.55 (0.40–0.70)	0.31 (0.20–0.42)
4	0.73 (0.66–0.80)	0.56 (0.48–0.65)	0.69 (0.59–0.79)	0.55 (0.42–0.68)
Specialty				
Pulmonology	0.62 (0.54–0.69)	0.26 (0.20–0.31)	0.69 (0.61–0.77)	0.29 (0.19–0.38)
Occupational medicine	0.53 (0.45–0.61)	0.28 (0.20–0.37)	0.56 (0.44–0.68)	0.26 (0.16–0.35)
Public health	0.51 (0.39–0.64)	0.12 (0.02–0.22)	0.56 (0.38–0.75)	0.30 (0.12–0.48)
Radiology	0.69 (0.61–0.77)	0.54 (0.45–0.64)	0.74 (0.64–0.83)	0.58 (0.44–0.71)
Years after graduation				
≤5	0.67 (0.60–0.75)	0.39 (0.32–0.46)	0.72 (0.63–0.80)	0.39 (0.27–0.51)
6–10	0.52 (0.44–0.61)	0.21 (0.16–0.27)	0.59 (0.48–0.70)	0.26 (0.17–0.35)
≥11	0.53 (0.45–0.61)	0.28 (0.20–0.36)	0.55 (0.43–0.67)	0.24 (0.14–0.34)
Number of reviewed pneumoconiosis CXR				
None	0.55 (0.48–0.62)	0.23 (0.15–0.31)	0.61 (0.52–0.70)	0.22 (0.14–0.30)
<10	0.63 (0.55–0.71)	0.32 (0.26–0.39)	0.68 (0.58–0.78)	0.33 (0.22–0.43)
<50	0.56 (0.47–0.64)	0.31 (0.24–0.38)	0.60 (0.46–0.73)	0.29 (0.17–0.41)
≥50	0.53 (0.42–0.64)	0.23 (0.11–0.36)	0.68 (0.57–0.79)	0.34 (0.19–0.49)

a= Computation included the readings of 40 radiographs (9 boundary cases and 31 radiographs with small opacities) for "small opacity shape"; included readings of all 60 radiographs for the others. b= Weighted kappa coefficient. c= Unweighted kappa coefficient.
All kappa coefficients were significant at $p<0.001$.
Interpretation of kappa coefficients: <0.2 = poor, 0.21–0.4 = fair, 0.41–0.6 = moderate, 0.61–0.8 = good, and 0.81–1.0 = almost perfect agreement.

ied. Physicians showed fair to good agreement with kappa values 0.30 (95% CI: 0.20–0.40), 0.29 (95% CI: 0.23–0.36), 0.59 (95% CI: 0.52–0.67), and 0.65 (95% CI: 0.55–0.74), respectively for classifying pleural plaques, small opacity shapes, small opacity profusion, and large opacities. The degree of agreement was different among physician groups. Physicians from Country 4, or groups formed by physicians who received radiology training, or were five or fewer years working after graduation, achieved the highest agreement in all types of lesion.

Fig. 1 depicts the ROC curves and average AUC values of the physician groups for each pneumoconiotic lesion. Table 3 compares physician groups for their accuracy scores. Accuracy in identifying small opacities, large opacities, and the pleural plaques, as determined by AUC and accuracy scores, was different among physician groups. Physicians from Country 4, or with radiology training, or who were five or fewer years working after graduation, showed the highest accuracy (Fig. 1 and Table 3). Accuracy scores for small opacity shape classification showed a similar pattern of differences (Table 3). No substantial difference in accuracy was detected between groups formed by the reported number of reviewed pneumoconiosis chest radiographs (Table 3).

Discussion

To our knowledge, this study is the first in comparing inter-observer agreement and accuracy in classifying radiographs for pneumoconiotic lesions using the ILO classification among physicians from different Asian countries. We observed that the degree of inter-observer agreement and diagnostic accuracy varied with the observer's characteristics, namely, residing country, specialty training, and time after graduation.

Physicians in this study showed better agreement in classifying parenchymal lesions than pleural plaques using the ILO classification. However, they agreed on the shape of small opacities poorly. The degree of agreement varied between countries, with kappa values ranging from 0.47 to

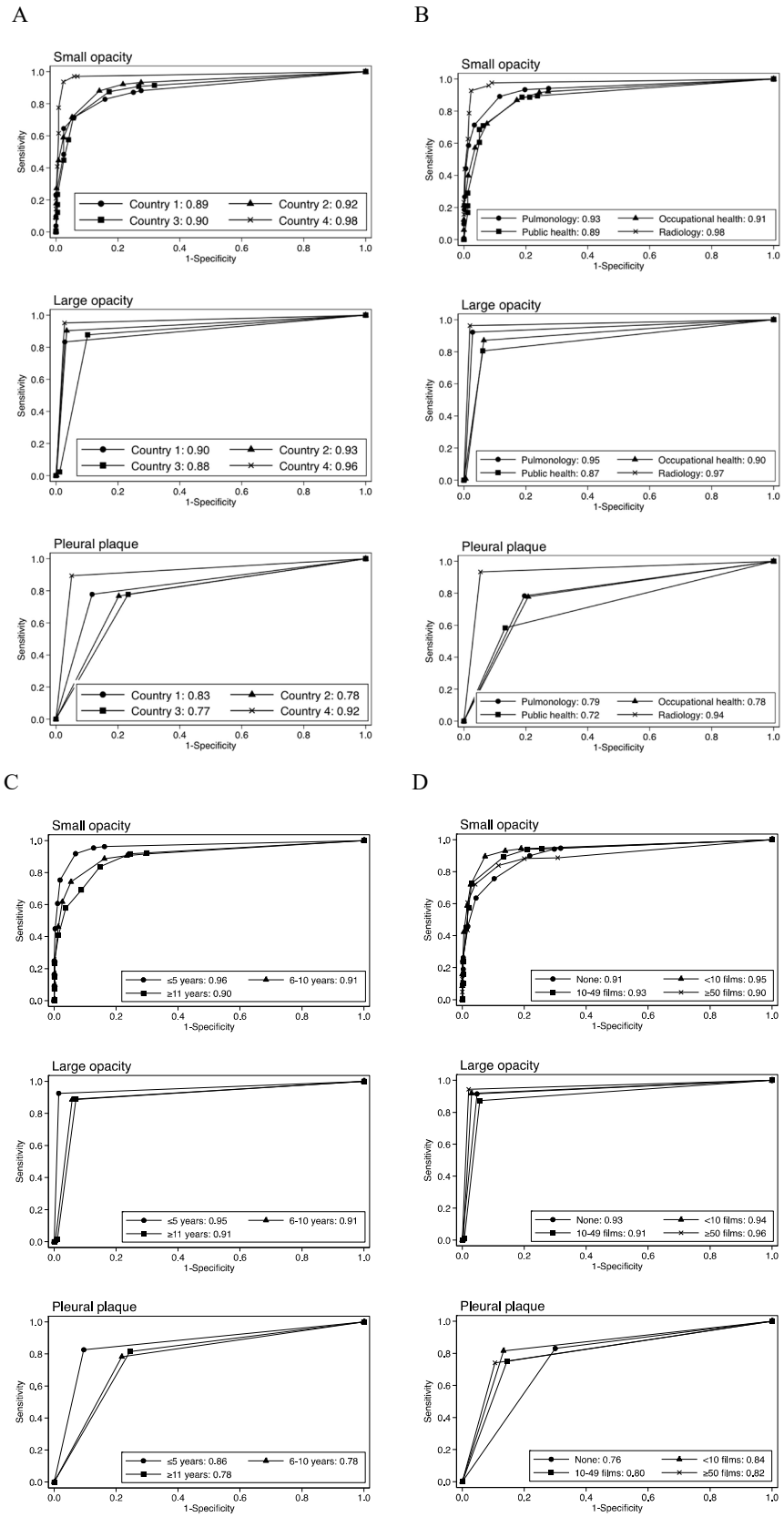

Fig. 1. Accuracy in classifying radiographs for the presence or absence of pneumoconiosis. Average AUC values of physician groups formed by (A) country, (B) specialty, (C) years after graduation, and (D) number of reviewed pneumoconiosis chest radiographs.

Table 3. Comparison between physician groups for accuracy in classifying radiographs for pneumoconiosis

	Physicians	Small opacity	Small opacity shape	Large opacity	Pleural plaque
	Number	Accuracy score[a], Median (Interquartile range)			
Physician overall	93	76.8 (29.3)	83.3 (25)	88.9 (23.3)	61.1 (25.5)
Country					
1	6	63.7 (13.5)***	79.2 (12.5)	74.1 (27.1)	68.3 (15.6)
2	54	73.9 (30.8)***	75 (20.8)***	88.9 (20.9)	56.1 (25.5)***
3	10	62.5 (16.8)***	66.7 (20.8)***	77.2 (19.5)**	55.0 (15.6)***
4 (Reference)	23	91.8 (12.9)	95.8 (12.5)	97.6 (13.5)	85.6 (18.9)
Kruskal-Wallis test		p<0.001	p<0.001	p=0.012	p<0.001
Specialty					
Radiology (Reference)	15	91.8 (25.0)	100 (16.7)	100 (13.5)	85.6 (18.9)
Pulmonology	40	77.1 (26.0)*	79.2 (22.9)**	95.1 (16.0)	58.3 (25.0)***
Occupational health	25	67.1 (35.8)**	75 (16.7)**	81.6 (30.6)**	60.0 (15.5)***
Public health	4	74.6 (32.2)	70.8 (31.2)*	72.4 (12.9)*	47.8 (13.3)***
Kruskal-Wallis test		p=0.005	p=0.002	p=0.003	p<0.001
Years after graduation					
≤5 (Reference)	37	87.1 (19.7)	87.5 (20.8)	97.6 (11.1)	75.6 (27.8)
6–10	27	70.0 (34.4)**	66.7 (29.2)***	84.0 (20.9)**	55.6 (38.9)**
≥11	15	67.1 (27.6)**	83.3 (12.5)	85.4 (16.0)*	57.8 (15.6)**
Kruskal-Wallis test		p<0.001	p= 0.002	p=0.005	p=0.001
Number of reviewed pneumoconiosis CXR					
None (Reference)	17	70 (27.1)	75 (25)	88.9 (18.4)	53.3 (25.6)
<10	41	83.9 (26.8)	83.3 (25)	95.1 (16.0)	67.8 (33.3)
<50	20	75.2 (30.9)	83.3 (22.9)	82.8 (25.3)	61.1 (28.9)
≥50	6	71.2 (26.4)	70.8 (29.2)	96.3 (8.7)	67.8 (26.7)
Kruskal-Wallis test		p=0.10	p=0.206	p=0.113	p=0.139

a= Accuracy scores are calculated as Youden's J index x 100, except for "small opacity shape". Scores for "small opacity shape" are percent agreement with experts' classification of small opacities as rounded or irregular.

Reference = reference group in Bonferroni correction for multiple comparisons.

p values of Bonferroni correction for multiple comparisons: * p<0.05, ** p<0.01, *** p<0.001.

0.73 (moderate to good agreement) on the distribution of small opacity profusion, from 0.55 to 0.69 (moderate to good agreement) for large opacity size, from 0.25 to 0.55 (fair to moderate agreement) for the presence or absence of pleural plaques, and 0.18 to 0.56 (poor to moderate agreement) for small opacity shape classification. The poor agreement between observers for the shape of small opacities was not unexpected. We have noted that of the 40 radiographs with small opacities from the AIR Pneumo examination film set, the expert panel agreed on small opacity shapes in only 24 radiographs. Moreover, studies that examined the shape classification of small opacities reported substantial variation existing between observers[16, 17]. Not many studies have examined inter-observer agreement involving multiple readers using the ILO classification. One Japanese study[18], which examined inter-observer agreement between film-screen radiography and two digital systems, reported the kappa values for the distribution of small opacity profusion on a twelve-point scale ranging from 0.55 to 0.64. However, their study involved a relatively small number of subject radiographs (n=30) and readers (n=3). In an American trial where seven B Readers classified 172 coal workers' chest radiographs, the reported kappa value of 0.58 for agreement on small opacity profusion was within the range of our results[19]. In a German study, seven physicians interpreted chest radiographs of 636 asbestos-exposed workers[8]. Their reports of an overall kappa value of 0.29 for small opacity profusion was considerably lower than the American study and ours, while 0.42 for pleural lesions was within the range of our findings. Another American study[7] evaluated 79,185 matched readings by A and B Readers from a coal workers' surveillance program; moderate agreement was seen only on the size of large opacities (kappa value 0.50). (A Readers and B Read-

ers are certified by the NIOSH of the USA. A physician can achieve A Reader status by attending a NIOSH-authorized course on the ILO classification system or submitting radiographs to the NIOSH with ILO classifications for review. To become a B Reader, a physician must pass a rigorous competency-based examination and maintaining B Reader status requires passing the recertification examination every 5 years. In the referenced study[7], B Readers classified more pneumoconiosis chest radiographs than A Readers did.) The authors concluded that the differences between readers in terms of training in the use of ILO classification and reading experiences were the likely reasons for the observed unsatisfactory agreement in classifying pleural changes (kappa value 0.16) and small opacity profusion (kappa value 0.24)[7]. In addition to the observers' characteristics, we suggested that the differences in study designs (including the number of radiographs and readers), the defined classifications for studied conditions, and the quality of chest radiographs being classified might have also contributed to the varying degree of inter-observer agreement found across studies.

Specialty training affects the level of diagnostic accuracy and hence the degree of agreement in classifying chest radiographs for pneumoconiosis. A past study reported the existence of differences in diagnostic capability between specialties in reviewing chest radiographs[20]. Our observation of the radiologists' group showing the highest performance, followed by the pulmonologists' group and the other specialties, also support this (Fig. 1; Table 3). Different physicians may have different thresholds for judging a chest radiograph between normal and abnormal. They may also have differing abilities to observe and recognize radiological appearances of pneumoconiotic lesions. The training to become a radiologist or a pulmonologist differs from that of other specialties. Also, radiologists and pulmonologists may have reviewed many more chest radiographs in routine work than physicians of other specialties. In our study, we observed that radiologists made up the highest proportion of "Country 4" and pulmonologists formed the majority in "Country 2" (Table 1); this uneven representation of specialties between countries was the likely source for differences found between countries.

Physicians' working years, as determined by years after graduation, did not ensure for a better agreement or higher accuracy. We observed better performance from the recent graduates (i.e., five or fewer years working after graduation) (Tables 2 and 3; Fig. 1). Uneven distribution of radiologists and pulmonologists between groups in our study might be one possible explanation for this observation. One previous study noted that to achieve high-level expertise in radiology requires a combination of radiology-specific training and deliberate practice, rather than an absolute number of working years[21]. Other reasons might be related to the nature of the AIR Pneumo training program. Being younger, recently graduated physicians might be able to absorb more information during the two days of intensive training than their seniors. Also, recent graduates would still be familiar with the time-limited examination environment and manage to produce better results.

Physicians' familiarity with the ILO classification and standard radiographs likely plays a significant role in the reading performance of our physicians. A past study suggested that the number of reviewed chest radiographs also contributed to the poor agreement between A Readers and B Readers[7]. However, we observed that relatively more numbers in reviewed pneumoconiosis chest radiographs appeared to be of no assistance to better observer agreement or higher accuracy in our physicians. A possible explanation might be that our physicians are not using ILO classification or the standard radiographs in their routine work. And thus, their reading experiences could not provide superior results in a test that required the ILO classification. Although we had not tested for it, our physicians' levels of understanding of the ILO classification might vary, contributing to the variation seen among groups.

Our physicians' diagnostic accuracy for pleural plaques appeared less satisfactory compared with parenchymal lesions. This finding was very similar to that observed in the U.S. B Reader program. Studies reported that physicians generally classify pleural changes poorly compared with parenchymal lesions, and this nature was the same for physicians who passed or failed the B Reader examinations[22, 23]. Without specific radiological expertise, the detection of pleural plaques in a chest radiograph becomes challenging. Pleural plaques are irregular, circumscribed lesions on the parietal pleura. Radiographically, they appear as discrete areas of pleural thickening and are barely visible in some cases[2]. In posteroanterior chest radiographs, shadows of anatomical structures (e.g., subcostal fat, serratus anterior muscles) or pleural thickening secondary to medical conditions (e.g., trauma, infection) may mimic plaques, and distinguishing them required a good knowledge of local anatomy and considerable experience[2, 24, 25]. A systematic review reported high false-negative and varying false-positive rates in diagnosing pleural plaques on a chest radiograph[24]. In a recent chest radiograph reading trial involving four readers with different clinical and radiography interpretation experiences (one B Reader and three AIR Pneu-

mo-certified physicians), the investigators reported a lower detection rate for pleural plaques compared with those for parenchymal lesions[26]. They also demonstrated that the detection rate varied among readers, with the most experienced one showing the highest rate. A similar trend was also seen in a study using surveillance data, where B Readers having far greater experiences in diagnosing pneumoconiosis identified more pleural plaques than A Readers did[7]. In the present study, our physicians, except the radiologists, showed a lower accuracy in identifying pleural plaques when compared with those of parenchymal lesions, indicating specific training is required to develop diagnostic accuracy and improve agreement in the diagnosis of pleural plaques.

Accurate diagnosis and reporting from physicians are vital to the success of screening programs and disease prevention. The ILO/WHO's Global Program for the Elimination of Silicosis (GPES), aiming to eliminate new cases of silicosis from all workplaces by 2030, set its strategy on early detection of diseases through surveillance along with dust exposure control[27]. Similarly, the WHO's Global campaign for the elimination of asbestos-related disease works through improving early diagnosis and establishing registries of people with past and/or current exposures along with other primary preventive measures[28]. A recent article reported the worldwide occurrence of increasing incidence of pneumoconiosis for the last three decades. Of the 60,055 incident cases in 2017, more than half occurred in Asia: 32,305 cases in China and 5,160 cases in India[29]. Moreover, as the importation and use of asbestos in developing Asian countries has been continuing, a substantial number of people may have been exposed to asbestos occupationally and non-occupationally[30]. In these circumstances, our findings have several important occupational and public health implications. First, we reported the degree of inter-observer agreement and sources for variation in classifying pneumoconiotic lesions among Asian physicians taking AIR Pneumo examination. The awareness of variability allows a careful comparison of results between different studies and knowledge of the source enables us to recommend measures to correct the variations. Second, we observed a low-level diagnostic accuracy and poor agreement in classifying radiographs for pleural plaques. Pleural plaques indicate past exposure to asbestos[31]; in most cases, they are asymptomatic and often identified as incidental chest radiographic findings[32]. Attending physician's familiarity with the radiological appearance of pleural plaques is central to their identification. The ILO standards radiographs illustrate a spectrum of radiological appearances seen in all types of pneumoconiotic lesions[4], the use of which permits physicians' familiarity with radiological appearances of pneumoconiosis, and thereby, improves diagnostic accuracy, especially for less experienced physicians[33]. Training in the use of the ILO classification, such as that provided by the AIR Pneumo, might promote physicians' reading skill further[34].

This study has several limitations. First, we used data derived from examinations. Participants might expect more radiographs showing signs of pneumoconiosis and assess them in a manner different from their routine work. However, we believed that the participants' enthusiasm and compliance with the standard assessment procedure made the data featured their actual performance in applying the ILO classification. Second, since our physicians have a common interest in pneumoconiosis, findings in this study may not necessarily represent the performance of Asian physicians in general. However, it should be noted that our physicians are grossly representing the physician population in pneumoconiosis screening in their respective countries. Third, we do not have information on the requirements of specialty training in each country. But we believe these might differ between specialties and between countries. We suggested the uneven specialty representation within each country requires careful interpretation of individual country results. Fourth, the different number of readers among the groups studied might affect the estimated kappa coefficients.

Conclusion

Reviewing chest radiographs using the ILO classification is the current international standard in screening for pneumoconiosis. Asian physicians taking the AIR Pneumo examination were better at classifying parenchymal lesions than pleural plaques using the ILO classification. The degree of inter-observer agreement differed among countries, and this difference was associated with a physician's specialty training background. Specific training on the use of the ILO classification, as provided by the AIR Pneumo, and continuing practice would improve diagnostic accuracy and lessen observer variability.

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Authors' Contribution

All authors contributed toward data collection and reviewed and approved this manuscript. NA J-P: Writing original draft, data curation, data analysis, review & editing. NS: Writing original draft, data curation, data analysis, review & editing. ADS: Data curation, review & editing. ES: Data curation, review & editing. MM: Data curation, review & editing. ST: Data curation, review & editing. SL: Data curation, review & editing. PS: Data curation, review & editing. SS: Data curation, review & editing. ND: Data curation, review & editing. EA: Data curation, review & editing. JEP: Data curation, review & editing. KGH: Data curation, review & editing. HK: Data curation, review & editing. TT: Data curation, review & editing. YK: Data curation, review & editing.

Conflict of Interest

None declared.

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Evaluation of the efficacy of the guideline on reading CT images of malignant pleural mesothelioma with reference CT films for improving the proficiency of radiologists

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ABSTRACT

Purpose: To assess the efficacy of the developed guideline on reading CT images of malignant pleural mesothelioma for improving radiologists' reading proficiency.
Materials and Methods: Three radiologists independently read the CT films of 22 cases including definite mesothelioma and non-mesothelioma cases at two times before and after studying the malignant pleural mesothelioma CT Guideline. The sensitivity and specificity for mesothelioma were calculated and compared between the 1st and 2nd trials. The kappa statistics was examined for agreement with experts for mesothelioma probability and for mesothelioma features recorded by three radiologists.
Results: After studying the mesothelioma CT Guideline, the sensitivity for mesothelioma shown by the three radiologists at the 2nd trial was 100%, 100% and 80%, which were higher than 80%, 85% and 60% at the 1st trial, respectively. The average kappa for agreement between radiologists and experts on dichotomized mesothelioma probability were 0.69 (good) at the 2nd trial vs. 0.38 (fair) at the 1st trial. The average kappa for the agreement with experts for each of 7 features by three radiologists were 0.52–0.80 at the 2nd trial, which were significantly higher than 0.34–0.58 at the 1st trial (Wilcoxon Signed Rank Test: $P < 0.01$), and as to five features "unilateral pleural effusion", "nodular pleural thickening", "tumoral encasement of lung", "mediastinal pleural thickening", and "diminished lung", they achieved good agreement with average kappa of 0.61–0.80.
Conclusion: The developed mesothelioma CT Guideline was suggested to have substantial effect in improving the radiologists' proficiency for reading CT images of mesothelioma, and may contribute to accurate diagnosis of mesothelioma.

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1. Introduction

The *International Classification of HRCT for Occupational and Environmental Respiratory Diseases* (ICOERD) was developed and used for occupational diseases screening, epidemiology study, and clinical study for respiratory diseases caused by occupational and environmental factors [1]. In order to supply ICOERD, we have developed the *Guideline on Reading CT Films of Malignant Pleural Mesothelioma* (MPM-CT Guideline) and selected MPM reference CT films [2]. The MPM-CT Guideline provides the terminology of MPM CT features and the MPM probability, the judgment for MPM in terms of involvement distribution and severity, as well as a method to record the CT finding of MPM on the CT reading sheet. The purpose of the current study was to investigate the efficacy of the developed MPM-CT Guideline with the MPM reference CT films for improving the proficiency of the inexperienced radiologists in reading CT images of MPM.

2. Materials and methods

2.1. Subject CT films

CT films of fifty seven cases including MPM, lung cancer, other malignancies, and benign pleural plaque were collected from the citizens living in the neighborhood of the Kubota factory, a large asbestos cement pipe factory in Amagasaki City, Hyogo Prefecture, Japan. Their MPM was caused by environmental exposure to asbestos (mainly crocidolite) air pollution from the Kubota asbestos factory [3].

Out of the 57 cases, 22 cases including 20 definite MPM cases and 2 pleural plaque cases were subjected to study. The MPM cases were clinically diagnosed as MPM at local hospitals and both pathologically and immunohistochemically confirmed [4,5]. Among the 20 cases of MPM, 7 cases were female, and 13 cases were male. The two cases of pleural plaque were male.

Among the 20 MPM cases, the diffuse type of MPM accounted for 18 (90%), and the localized type for the other 2 cases (10%). The numbers of the cases with MPM CT features among 20 MPM cases by MPM probability are shown in Table 1. The CT images of several representative MPM cases among the 20 MPM cases are shown as Figs. 1–5.

2.2. The MPM reference CT films

The MPM reference CT films and CT subject images were used by radiologists only at the 2nd reading trial for comparison of the subjects' CT findings with MPM reference films. The ten typical MPM features on the reference CT films included "unilateral pleural effusion" ("ue"), "nodular pleural thickening" ("nt"), "interlobar fissure thickening" ("it"), "mediastinal pleural thickening" ("mt"), "tumoral encasement of lung" ("te"), "calcified plaque engulfment" ("pe"), "invasion" (iv"), "diminished lung" ("dl"), "contracted hemithorax" ("ch") and "pleural mass" ("pm"). Each MPM feature was indicated by an arrow on the reference CT digital images and hard-copied CT reference films. The CT images of typical MPM features are shown as in Fig. 1 through Fig. 9 in a parallel publication [2].

2.3. CT reading trials of 22 cases by three radiologists

Three radiologists participated in independent reading of CT films. All of the radiologists had good proficiency and rich experience in reading CT for pneumoconioses. However, they had not seen many MPM cases previously. Before achieving the 1st and 2nd reading trials, they were blinded to the information of the patients' asbestos exposure history, and the clinical and histological diagnosis for any cases.

At the 1st CT reading trial, the three radiologists were requested to read the monograph of ICOERD and the ICOERD CT reference films, but not to read the MPM-CT Guideline nor the MPM reference CT films, then they read the 22 subject CT films independently. The CT findings associated with asbestosis were recorded according to ICOERD guideline; the MPM features and the MPM probability grade for each case were recorded into the reading sheet according to their experiences.

The interval between the 1st and the 2nd CT reading trials by the three radiologists was at least three months. At the 2nd trial, before reading the subject CT films, the three radiologists read the ICOERD guideline with the ICOERD CT reference films again. They also independently studied the MPM-CT Guideline with the MPM reference CT films, and then independently read the 22 subject CT films. They made use of the ICOERD CT reference films and the MPM reference CT films to record the CT findings for pneumoconiosis, the MPM findings, and the MPM probability grade in the CT reading sheets.

2.4. Statistical analysis

According to the definition for the MPM probability in the MPM-CT Guideline [2], Grade 1 was negative for MPM, no abnormal findings on CT, or the abnormal findings of other diseases; Grade 2 was low probability of MPM; Grade 3 was moderate probability of MPM; Grade 4 was high probability of MPM. Sensitivity for MPM was the proportion of cases for which MPM probability Grade $\geq$2 recorded by radiologists for each among the 20 MPM cases. Specificity for MPM was the proportion of cases for which MPM probability Grade = 1 was recorded by individual radiologists among the 2 non-MPM cases, shown as Table A in Supplementary Appendix. The sensitivity and specificity for MPM by the three radiologists were calculated and compared between the 1st and the 2nd reading trials.

The weighted kappa for the agreement of the three individual radiologists with the consensus by the four experts (K.G.H., M.A., H. A., H. I.) on the 4-point scale MPM probability was calculated using R-software version 2.14.1 (http://www.r-project.org/), as shown in Table B in Supplementary Appendix. The kappa for the agreement on dichotomized MPM probability was calculated by stratifying the cases with MPM probability Grade 2, 3, 4 into one group, and the cases with MPM probability Grade = 1 into the other group, as shown in Table C in the Supplementary Appendix. The observed agreement on dichotomized MPM probability between radiologist and experts was also calculated. The calculation of kappa for the agreement on MPM CT feature between radiologist and experts is shown as Table D in the Supplementary Appendix. A kappa value <0.20 was considered as poor agreement, 0.21–0.40 was as fair agreement, 0.41–0.60 was as moderate agreement, 0.61–0.80 was as good agreement, and 0.81–1.00 was as excellent agreement [6]. The kappa values for the 7 MPM CT features by the three radiologists between the 1st trial and 2nd trial were compared by 2-Related-Samples Nonparametric Test (Wilcoxon Signed Rank Test).

3. Results

3.1. The MPM probability and the 7 MPM CT features among the 20 MPM cases

The MPM probability and the 7 MPM CT features (7-MPM-CT features) agreed by the four experienced experts for the 20 subject cases of MPM are shown as Table 1.

Table 1
The number of cases with the 7-MPM-CT features among the 20 MPM cases according to MPM probability.

Cases with MPM probability	The number of cases with the MPM feature						
	ue	nt	it	mt	te	iv	dl
Grade = 1 (n = 0)	0	0	0	0	0	0	0
Grade = 2 (n = 3)	0	1	0	0	0	2	0
Grade = 3 (n = 7)	5	2	4	7	0	1	4
Grade = 4 (n = 10)	8	10	7	10	5	6	10
Total (n = 20)	13 (65%)	13 (65%)	11 (55%)	17 (85%)	5 (25%)	9 (45%)	14 (70%)

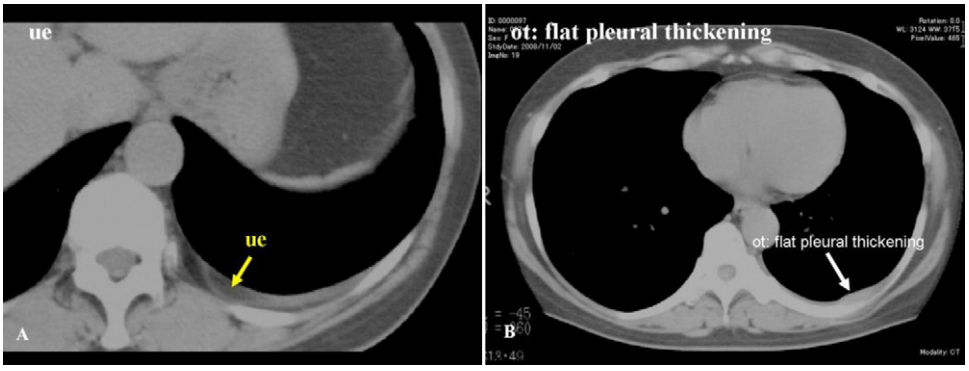

Fig. 1. A 52-year-old women with diffuse epithelioid MPM. CT scans show slight unilateral pleural effusion (A) and flat pleural thickening in the left hemithorax (B). According to the CT appearance, the MPM probability was agreed as low probability Grade 2 at mild severity by experts.

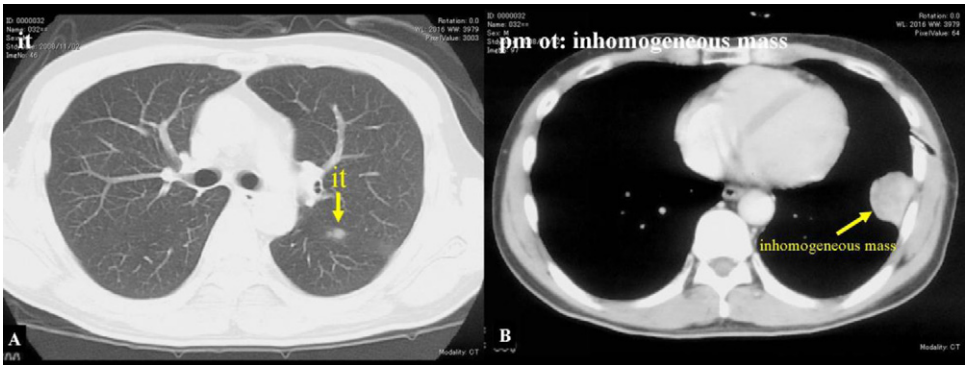

Fig. 2. A 49-year-old man with biphasic MPM. CT scans show interlobar fissure pleural thickening ("it") at the left lung (A), and the left-side pleural mass with involvement of chest wall (B). According the CT appearance, the MPM probability was agreed by experts as low probability Grade 2. The differential diagnosis for this case is mainly sarcoma.

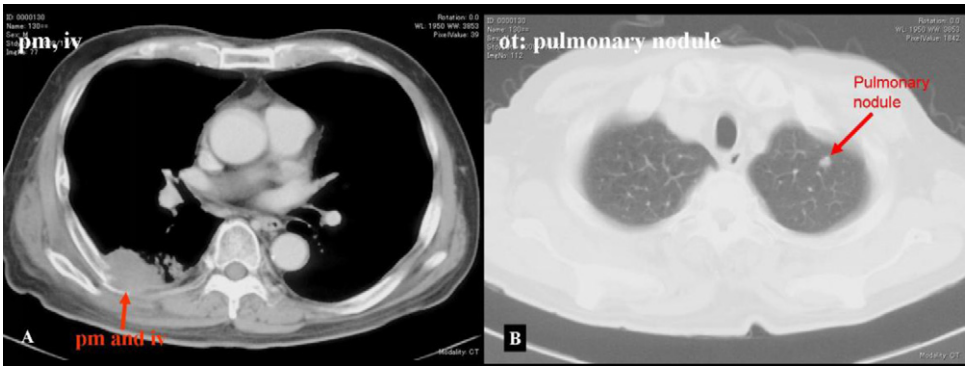

Fig. 3. A 68-year-old man with localized sarcomatoid MPM. CT scan demonstrates a right-sided pleural mass invasion ("iv") to the chest wall destroying rib structure (arrow) (A). There is a pulmonary nodule on the left lung (B). This case was agreed as MPM of moderate probability Grade 3 at advanced severity. The different diagnosis is firstly sarcoma and secondly possible metastasis from other cancer.

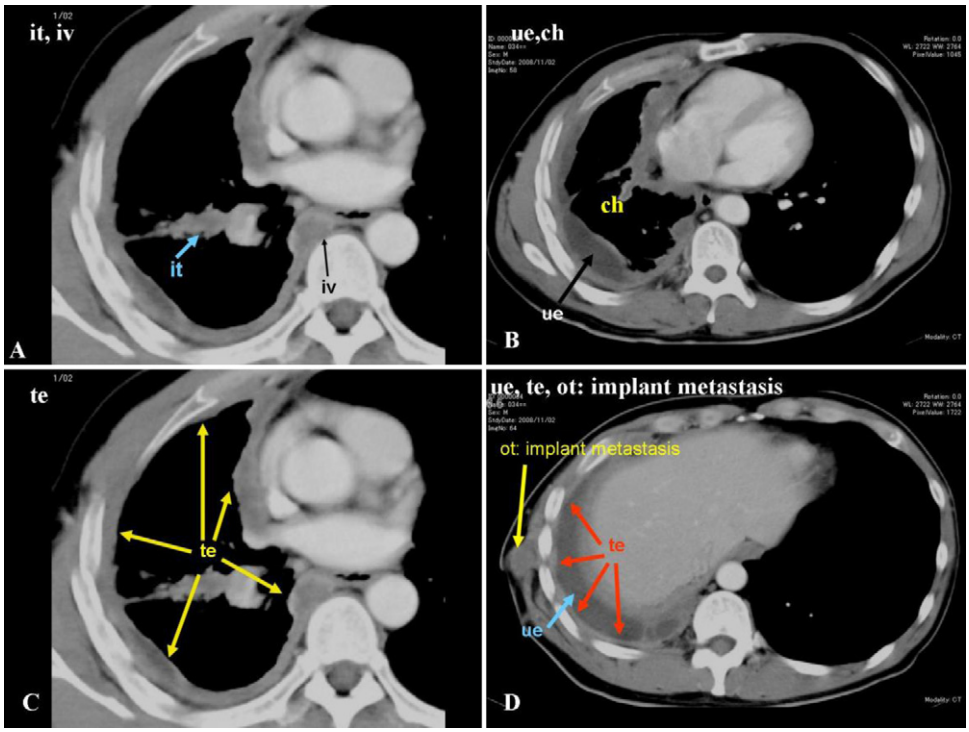

Fig. 4. A 45-year-old man with diffuse epithelioid MPM. CT scan shows interlobar fissure pleural thickening (A), invasion to the tissue near to the vertebral column ("iv") (black arrow) (A). There is unilateral pleural effusion ("ue") (black arrow) on the right hemithorax, leading to the contracted hemithorax ("ch") (B). Tumoral encasement of lung ("te") involvement on the right hemithorax (C, D) and an implant metastasis lesion are observed on the chest wall of right lung (D). According the CT appearance, MPM probability was agreed by experts as high probability Grade 4 at advanced severity. This is a typical MPM case.

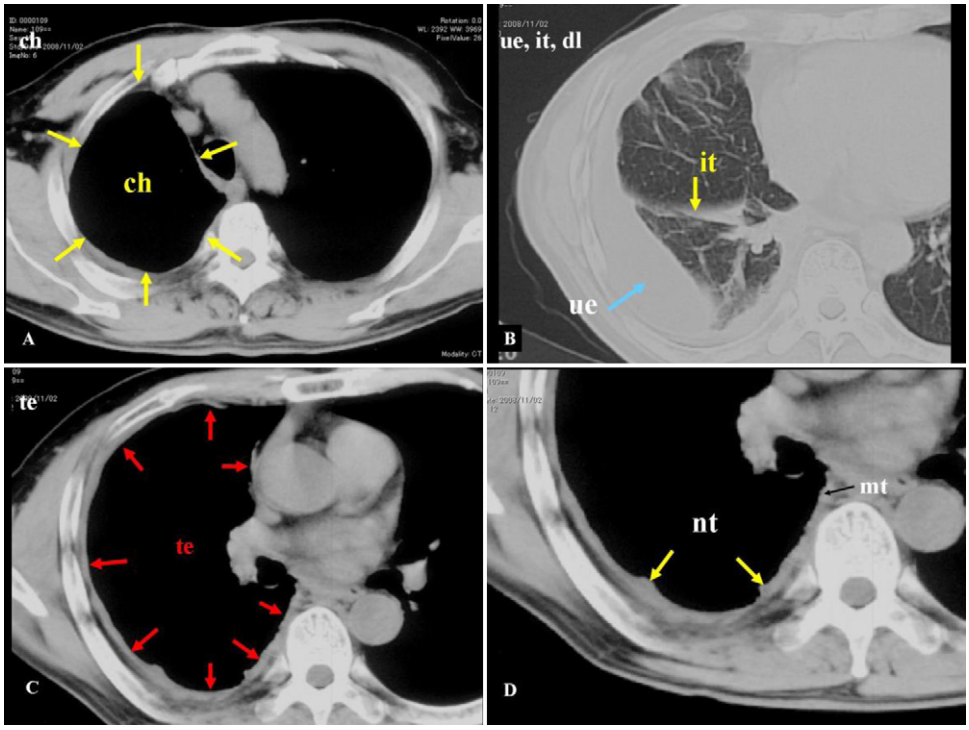

Fig. 5. A 58 year-old man with diffuse desmoplastic MPM. CT scan shows contracted hemithorax ("ch") leading to the right hemithorax volume loss (A). There is interlobar fissure pleural thickening ("it"), together with unilateral pleural thickening ("ue"), causing the lung volume diminished ("dl") (B). The involvement of tumoral encasement of lung ("te") (C), nodular pleural thickening ("nt") and mediastinal pleural thickening ("mt") (black arrow) on the right hemithorax are observed (D). MPM probability was agreed by experts as high MPM probability Grade 4 at advanced severity. This is a typical MPM case.

Table 2
Agreement on dichotomized MPM probability with 4 experts' consensus and sensitivity and specificity for MPM by three radiologists at the two trials.

Reader	Reading trial	Agreement with experts on dichotomized MPM probability	Sensitivity for MPM	Specificity for MPM
Radiologist 1	1st	18/22 (81.82%)	16/20 (80%)	2/2 (100%)
	2nd	21/22 (95.45%)	20/20 (100%)	1/2 (50%)
Radiologist 2	1st	19/22 (86.36%)	17/20 (85%)	2/2 (100%)
	2nd	22/22 (100%)	20/20 (100%)	2/2 (100%)
Radiologist 3	1st	14/22 (63.64%)	12/20 (60%)	2/2 (100%)
	2nd	18/22 (81.82%)	16/20 (80%)	2/2 (100%)

Among the 20 definite MPM cases, the cases with MPM probability Grade 2, Grade 3 and Grade 4 accounted for 3/20 (15%), 7/20 (35%) and 10/20 (50%), respectively.

For the 3 cases with MPM probability Grade 2, the cases with the feature "nodular pleural thickening" ("nt") accounted for 1/3(33.33%), and the cases with "invasion" ("iv") accounted for 2/3 (66.67%).

Among the 7 cases with MPM probability Grade 3, the cases with feature "medialstinal pleural thickening" ("mt") accounted for 7/7 (100%), the feature of "unilateral pleural effusion" ("ue") were present in 5/7 (71.43%), "interlobar fissure thickening" ("it") in 4/7 (57.14%), "diminished lung" ("dl") in 4/7 (57.14%), "nt" in 2/7 (28.57%), and "iv" in 1/7 (14.29%).

Among the 10 cases with MPM probability Grade 4, the most frequently recorded features were "nt" in 10/10 (100%), "mt" in 100%, and "dl" in 100%. The cases with feature "ue" were in 80%, "it" in 70%, "iv" in 60%, and "tumoral encasement of lung" in 50%.

3.2. The sensitivity and specificity for MPM by three radiologists, the agreement on MPM probability by radiologists with experts

The sensitivity for MPM, specificity for MPM and observed agreement on the dichotomized MPM probability by 3 radiologists at two times of CT readings before and after studying the MPM-CT Guideline are shown as in Table 2.

The sensitivity for MPM by the three radiologists at the 2nd trial was 100%, 100% and 80%, which was higher than 80%, 85% and 60%, respectively at the 1st reading trial. The observed agreements on dichotomized MPM probability by radiologists were increased at the 2nd trial compared with those at the 1st trial.

The values of weighted kappa for the agreement of MPM probability on the 4-point scale by three radiologists with experts were increased at the 2nd trial, compared with those at the 1st trial, as shown in Table 3.

The weighted kappa values for the agreement with experts on 4-point scale MPM probability by three radiologists were 0.32, 0.51 and 0.37 at the 2nd trial vs 0.24, 0.48 and 0.29 at the 1st trial, respectively. The kappa value for inter-reader agreements on the dichotomized MPM probability between radiologists and experts at the 2nd reading trial were 0.65 (good), 1 (excellent) and 0.42 (moderate), respectively, which were significantly higher than 0.42 (moderate), 0.51 (moderate) and 0.21 (fair) at the 1st trial, respectively. The average kappa for the agreement on dichotomized MPM probability between radiologists and experts were 0.69 (good) at the 2nd trial vs 0.38 (fair) at the 1st trial, which seemed to show an upgrading in reading skill.

3.3. The agreement on MPM features between radiologists and experts

The results of the agreements for the recorded MPM features between the three radiologists and experts are shown as in Table 4.

For radiologist 1, the agreement with experts for 6 features "unilateral pleural effusion" ("ue"), "nodular pleural thickening" ("nt"), "interlobar fissure thickening"("it"), "mediastinal pleural thickening" ("mt"), "invasion" ("iv") and "diminished lung" ("dl") at the 2nd reading trial was better compared with those at the 1st trial. The agreement for feature "ue" and "nt" at the 2nd trial was good (kappa = 0.62 and 0.61, respectively). The agreement for feature "tumoral encasement of lung" ("te") at the 2nd trial was excellent to the same extent as that at the 1st trial (kappa = 0.86). The agreement with experts on 3 features ("mt", "iv" and "dl") was markedly increased to excellent (kappa > 0.8) at the 2nd trial.

For radiologist 2, the kappa values for the agreement with experts were increased for 5 features ("ue", "nt", "mt", "te" and "dl") at the 2nd trial in comparison with those at the 1st trial. The kappa values for the features "ue", "nt" and "te" showed good agreement with experts (kappa > 0.6), and "mt" and "dl" showed excellent agreement (kappa > 0.8). The kappa values for the feature "it" and "iv" was 0.55 and 0.51 at the 2nd trial, which were lower than 0.73 and 0.61 at the 1st trial, respectively.

For the radiologist 3, the kappa values for 5 features ("nt", "mt", "te", "iv" and "dl") were increased at the 2nd trial in comparison with the 1st trial. The feature "nt" and "te" shows good agreement with expert (kappa = 0.64 and 0.77, respectively). The kappa value for the feature "it" at the 2nd trial was equal to that one at the 1st trial. The kappa value for the feature "ue" (0.49) at the 2nd trial was lower than at the 1st trial (0.65).

The average kappa values of 7 MPM CT features at the 2nd trial by the three radiologists were significantly increased in comparison with the 1st trial, and the six features "ue", "nt", "mt", "te" and "dl" showed good agreement between radiologists and experts (kappa > 0.60).

Table 5 shows that the kappa values for the agreement on the 7 MPM CT features by the three radiologists with experts were significantly higher than those at the 1st trial.

Table 3
Agreement on 4-point scale MPM probability and dichotomized MPM probability between radiologist and experts in terms of weighted kappa.

Reader	4-scale MPM probability K_w (95% CI)		Dichotomized MPM probability K_w (95% CI)	
	1st trial	2nd trial	1st trial	2nd trial
Radiologist 1	0.24 (−0.06, 0.54)	0.32 (0.06, 0.58)	0.42 (−0.09, 0.93)	0.65 (−0.03, 1)
Radiologist 2	0.48 (0.19, 0.76)	0.51 (0.24, 0.78)	0.51 (−0.01, 1)	1
Radiologist 3	0.29 (0.04, 0.53)	0.37 (0.12, 0.62)	0.21 (−0.22, 0.65)	0.42 (−0.09, 0.93)
Weighted kappa Mean(SD)	0.34 (0.13)	0.40 (0.10)	0.38(0.15)	0.69(0.29)

Table 4
Agreement for the recorded MPM CT features between radiologists and experts by kappa statistics.

Reader	Reading trial	Experts						
		ue	nt	it	mt	te	iv	dl
Radiologist 1	1st	0.32	0.35	0.36	0.20	0.86	0.25	0.49
	2nd	0.62	0.61	0.55	0.88	0.86	0.81	0.80
Radiologist 2	1st	0.65	0.31	0.73	0.68	0.60	0.61	0.73
	2nd	0.72	0.70	0.55	1	0.77	0.51	0.90
Radiologist 3	1st	0.65	0.37	0.45	0.39	0.28	0.25	0.17
	2nd	0.49	0.64	0.45	0.47	0.77	0.49	0.57
All radiologists Mean (SD)	1st	0.54 (0.19)	0.34 (0.03)	0.51 (0.19)	0.42 (0.24)	0.58 (0.29)	0.37 (0.21)	0.46 (0.28)
All radiologists Mean(SD)	2nd	0.61 (0.12)	0.65 (0.05)	0.52 (0.06)	0.78 (0.28)	0.80 (0.05)	0.60 (0.18)	0.76 (0.17)

Note: 1st and 2nd indicates the 1st CT reading trial and the 2nd CT reading trial, SD = standard deviation of kappa values.

Table 5
Comparative analysis for the kappa values for the agreement with experts on the 7 MPM CT features by all three radiologists between the two reading trials by means of 2-Related-Samples Nonparametric Test (Wicoxon Signed Rank Test).

Kappa 2–Kappa 1*	Number of pairs	Mean rank	Sum of ranks	*P*
Negative ranks[a]	3	4.67	14	<0.01
Positive ranks[b]	16	11	176	
Ties[c]	2			
Total	21			

Note: *Kappa 2: kappa value for the agreement by three radiologists with expert on the 7 features recorded at the 2nd reading trial. Kappa 1: kappa value for the agreement by three radiologists with expert on the 7 features recorded at the 1st reading trial.

[a] Kappa 2 < Kappa 1.
[b] Kappa 2 > Kappa 1.
[c] Kappa 2 = Kappa 1.

4. Discussion

With the development of modern technology, CT scans have now become routine clinical practice for detecting pleural abnormalities in patients. The diagnosis of MPM is usually based on the combination of occupational history, physical and laboratory examination, radiology and the thoracic pathology. CT findings are important to provide the clue in the diagnosis of MPM before any invasive biopsy procedures take place. Diagnosis of MPM at the early stage may enable patients to obtain a better outcome with multiple modality therapy including extensive surgery, chemotherapy, and radiotherapy, which may offer increases in survival time and the life quality for MPM patients [7].

The MPM-CT Guideline was developed by the international experts' efforts [2]. The Guideline provided a standardized way for physicians to record CT findings on subject CT films with the assistance of the MPM reference CT films with typical MPM features. These allow the physicians to make appropriate judgments for the MPM probability, which is determined by the overall impression of the CT findings as a whole and comprehensive evaluation on CT findings being consistent or inconsistent with MPM features, the severity of the diseases, and the distribution of MPM involvement.

Among the 20 definite MPM cases in the current study, the mostly seen features in the number were "mediastinal pleural thickening" ("mt") (85%), and then were "diminished lung" ("dl") (70%), the "unilateral pleural effusion" ("ue") (65%), "nodular pleural thickening" ("nt") (65%) and "interlobar fissure thickening" ("it") (55%). The cases with "invasion" accounted for 45%. Most of the 7 features are suggestive of MPM to somewhat through quite extent and frequently common on the CT images of MPM [8].

The relationship between the MPM probability and the number of 7-MPM-CT features in each case was investigated. Among the 20 MPM cases, those cases with the high MPM probability (Grade 3, 4) were found to have more of 7-MPM-CT features. It was suggested that the more features observed on the CT, the higher MPM probability for the case determined, presenting with a positive correlation. The severity in association with the feature may be the second reason related with probability of MPM. When the features are at severe disease stages, the cases may have high MPM probability, even with only a few features of these.

The relatively high prevalence and frequency of "unilateral pleural effusion" in MPM is of major diagnostic importance [9]. At the early stage of MPM, irrespective of normal-appearing pleura, "unilateral pleural effusion" can be the only finding. The main mechanism of pleural fluid formation in malignancy is lymphatic obstruction. For the cases with pleural effusion and a history of asbestos exposure, MPM should be considered and further investigation should be conducted [10].

There were two features listed in the MPM-CT Guideline "contracted hemithorax" ("ch") and "pleural mass" ("pm") not included in the current comparative analysis, because these two features were later added at the 2nd workshop to the proposed MPM-CT Guideline. The two features are crucial and helpful to make diagnosis of MPM. Solitary masses may occur at the early stage, while multiple masses are more common at later stages [11]. MPM tend to spread along the pleural surface in a "sheet-like" fashion [12]. In CT images with feature "ch", the involved hemithorax is noticeably contracted from a comparison with that in the contralateral lung.

The current study showed that after studying the MPM-CT Guideline, the sensitivity for MPM by all three radiologists was

increased at the 2nd trial compared with those at the 1st trial. For the 1st radiologist, although the specificity for MPM at the 2nd trial was lower than at the 1st trial, the observed agreement for the MPM probability was increased to 95.45% at the 2nd trial vs 81.82% at the 1st trial.

Kappa is affected by prevalence of the finding under observation [13,14]. In the current study, the proportion of the non-MPM cases among total case was only in 10%, and many cases (50%) had MPM probability Grade 2 or Grade 3, which had great variances between readers. Therefore the weighted kappa on 4-scale MPM probability proved to be low. However, the analysis with the dichotomized MPM probability showed that two radiologists obtained good and excellent agreements, i.e., kappa = 0.65 and 1, respectively. The 3rd radiologist had achieved moderate agreement with kappa 0.42 on dichotomized MPM probability at the 2nd trial vs kappa 0.21 at the 1st trial.

The kappa statistics showed that good through to excellent agreements with experts by two of the three radiologists were obtained at the 2nd trial for 5 and 6 features, respectively. For the radiologist 3, there were 5 features including "nt", "mt", "tumoral encasement of lung" ("te"), "invasion" ("iv") and "dl" with increased agreements with experts at the 2nd trial compared with those at the 1st trial. Compared with those at the 1st trial, the average kappa values of 7 features by the three radiologists were increased at the 2nd trial, in which the five features, i.e., "ue", "nt", "mt", "te" and "dl", showed good agreement with experts. Wicoxon Signed Rank Test showed that the kappa values for the agreement on the 7 MPM CT features between the three radiologists and experts were significantly higher than those at the 1st trial. These revealed that the radiologists had made improvement in recognition of the MPM CT features at the 2nd trial compared with the 1st trial.

Compared to the other features in the 20 MPM cases, the agreement with experts in the feature "invasion" was relatively lower. At the 2nd trial, the kappa for "invasion" was 0.51 by the 2nd radiologist and 0.49 by the 3rd radiologist, respectively. This implied that the feature "invasion" was difficult to identify compared to the other MPM features. One reason may be its frequent coexistence with other features that the appearance of this feature may become less notable. The severity of the invasion to the lung structure may be the second reason. If it was less severe, "invasion" may not be easy to identify. This feature of "invasion" is quite suggestive of malignancy. This feature overlaps with metastasis of other carcinoma [15], while the other malignancy also has lung parenchymal involvement.

The average kappa for the agreements between radiologists and experts on feature "interlobar fissure thickening" was 0.51 and 0.52 at the 1st and 2nd trials, respectively, which were lower than those of other features. The reason may be ascribed to the fact that "interlobar fissure thickening" in some cases is so slight that it may easily be neglected. The feature "interlobar fissure thickening" reflects tumor growth along the interlobar spaces, and may represent one of the earliest significant MPM features, which is seen less frequently in other malignancies or in benign pleural diseases [16].

The CT findings in MPM are not pathognomonic because similar findings may be found in metastatic carcinoma. Nevertheless, they are characteristic. The MPM features can provide valuable information to make a diagnosis of MPM. By identifying the MPM features on CT images, clinicians can recognize MPM [17]. It will be helpful for occupational physicians during the occupational disease screening in health surveillance for workers.

One limitation of the study was that there were only two non-MPM cases with pleural plaque. This may affect the specificity for MPM. Despite the limitation, the results of the comparative study showed that all three radiologists had improved their sensitivity for MPM after studying the MPM-CT Guideline. Two of them had obtained either good or excellent agreements with experts in identifying most of features at the 2nd trial. These suggested that reliability of the Guideline and the MPM reference CT films to improve the reading proficiency of the radiologists may be validated.

5. Conclusions

The current study suggested that the three radiologists improved the proficiency in diagnosis for MPM by identifying of MPM CT features after studying the MPM-CT Guideline with reference MPM CT features. The MPM-CT Guideline and reference CT films may act as good tool to facilitate physicians in recognition of MPM features and contribute to early diagnosis of MPM in the health surveillance.

Conflict of interest statement

None of the authors has a financial relationship with a commercial entity that has an interest in the subject of this manuscript.

Role of the funding source

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ejrad.2012.05.022.

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Short Communication

Proficiency in Reading Pneumoconiosis Radiographs Examined by the 60-film Set with 4-factor Structuring 8-index

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Abstract: 29 physicians (A1-Group) and 24 physicians (A2-Group) attending the 1st and 2nd "Asian Intensive Reader of Pneumoconiosis" (AIR Pneumo) training course, respectively, and 22 physicians (B-Group) attending the Brazilian training course took the examination of reading the 60-film set. The objective of the study was firstly to investigate the factor structure of physicians' proficiency of reading pneumoconiosis chest X-ray, and secondly to examine differences in factor scores between groups. Reading results in terms of the 8-index of all examinees (Examinee Group) were subjected to the exploratory factor analysis. A 4-factor was analyzed to structure the 8-index: the specificity for pneumoconiosis, specificity for large opacities, specificity for pleural plaque and shape differentiation for small opacities loaded on the Factor 1; the sensitivity for pneumoconiosis and sensitivity for large opacities loaded on the Factor 2; the sensitivity for pleural plaque loaded on the Factor 3; the profusion increment consistency loaded on the Factor 4. 4-Factor scores were compared between each other of the three groups. The Factor 2 scores in A1 and A2 groups were significantly higher than in B-Group. Four factors could reflect four aspects of reading proficiency of pneumoconiosis X-ray, and it was suggested that 4-factor scores could also assess the attained skills appropriately.

Key words: Pneumoconiosis, ILO Classification, Sensitivity, Specificity, Chest X-ray, Factor analysis

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In the current authors' preceding paper[1)], we have suggested that 8 indices reflect reading proficiency for pneumoconiosis in individuals and groups and be used appropriately for assessing examination results from reading 60-film sets: sensitivity for pneumoconiosis, specificity for pneumoconiosis, sensitivity for large opacities, specificity for large opacities, sensitivity for pleural plaque, specificity for pleural plaque, profusion increment consistency for small opacities, and shape differentiation for small opacities. The exam films, the correct answers, the criteria for 8 indices in 60 exam films, and the assessment algorithm were described in the Appendix in the literature[1)].

There were 29 physicians (A1-Group) and 24 physicians (A2-Group) attending the 1st and 2nd "Asian Intensive Reader of Pneumoconiosis" (AIR Pneumo), respectively, and 22 physicians attending the Brazilian Training Course (B-Group) took examination of reading 60-film set described extensively in the authors' paper[1)]. The Examinee Group included A1-Group, A2-Group and B–Group. The summary of the reading results in terms of the 8 indices for all groups was shown in Table 2 in our preceding paper[1)].

Factor analysis is a statistical approach that can be used to analyze inter-relationships among a large number of variables and to explain these variables in terms of their common underlying dimensions (factors)[2)]. The statistical approach involves a way of condensing the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information. In recently years, factor analysis gradually has become the most frequently used statistical method in the field of education and social psychological study[3, 4)]. There has been only one paper published on pneumoconiosis concerning the research by factor analysis of the clinical data of asbestos exposed workers[5)] and several papers on the study by factor analysis of respiratory diseases[6, 7)].

The current study aimed at investigating the factor structure of the 8 indices of physicians reading pneumoconiosis chest X-ray, exploring the underlying factors in the physicians' proficiency of the reading chest x-ray of pneumoconiosis, and studying the appropriateness to test the proficiency of examinees in the three training courses by calculating the factor scores.

The multivariate exploratory factor analysis was performed using SPSS 16.0 for the reading results of Examinee Group (SPSS Inc., USA)**.** An initial principal component analysis was conducted to determine the final number of factors. An orthogonal rotation (Varimax rotation) was executed to yield the simple factor structure, facilitating the interpretation of the factors[8)].

The correlation matrix among the 8 indices of all examinees is shown as Table 1.

For the number of factors extraction, the most frequently used criterion for retaining factors is the Kaiser's criterion (Eigenvalue >1) [9)]. However, if we took this criteria, the communalities were less than 0.7 after extraction with eigenvalues more than 1, therefore, selecting factors with an eigenvalue >1 was not an accurate criterion according to the literature[10, 11)], in our study, too. On the other hand, Jolliffe argued that since Kaiser's criterion might be too strict, it discards too much information. And Jolliffe suggested a cut-off of eigenvalue 0.7 for retaining factors, instead of 1[12, 13)]. Based on the Jolliffe's criterion (Eigenvalue >0.7), a 4-factor structure matrix was accurately generated with a variance of more than 80%, as shown in Table 2.

Table 2 indicates that the cumulative variance from the

Table 1. The correlation matrix among the 8 indices of all examinees

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
X_1	1.000							
X_2	0.172	1.000						
X_3	0.591	0.155	1.000					
X_4	0.505	0.468	0.260	1.000				
X_5	0.264	0.370	0.307	0.372	1.000			
X_6	0.457	0.521	0.316	0.597	0.262	1.000		
X_7	0.414	0.343	0.229	0.222	0.126	0.293	1.000	
X_8	0.491	0.447	0.380	0.444	0.308	0.620	0.308	1.000

X_1: Sensitivity for pneumoconiosis, X_2: Specificity for pneumoconiosis, X_3: Sensitivity for large opacities, X_4: Specificity for large opacities, X_5: Sensitivity for pleural plaque, X_6: Specificity for pleural plaque, X_7: Profusion increment consistency, X_8: Shape differentiation for small opacities.

Table 2. Varimax rotated factor-loading matrix from factor analysis

Variable	Factor 1	Factor 2	Factor 3	Factor 4
Sensitivity for pneumoconiosis	0.378	0.792*	0.002	0.218
Specificity for pneumoconiosis	0.638*	–0.208	0.436	0.395
Sensitivity for large opacities	0.123	0.848*	0.218	0.067
Specificity for large opacities	0.762*	0.213	0.222	–0.006
Sensitivity for pleural plaque	0.175	0.212	0.925*	0.008
Specificity for pleural plaque	0.865*	0.195	0.027	0.116
Profusion increment consistency	0.143	0.215	0.016	0.943*
Shape differentiation for small opacities	0.702*	0.335	0.085	0.166
Eigenvalue	3.625	1.101	0.908	0.770
Total variance explained, %	45.31	13.76	11.35	9.62

*Variables with high loading coefficient>0.6.

Table 3. Comparative analyses for the factor scores between each other of the three groups

Factor score	A1-Group (n=29)	A2-Group (n=24)	B-Group (n=22)
Factor score 1	–0.118 ± 1.223	0.091 ± 0.650	0.056 ± 1.016
Factor score 2	0.191 ± 0.977*	0.326 ± 0.613#	–0.608 ± 1.132*#
Factor score 3	–0.103 ± 0.913	0.209 ± 0.870	–0.092 ± 1.228
Factor score 4	0.036 ± 0.990	0.026 ± 0.983	–0.076 ± 1.072

Values are Mean ± SD. *Comparison between A1 and B-Group by Bonferroni multiple comparisons test, $p<0.05$. #Comparison between A2 and B-Group by Bonferroni multiple comparisons test, $p<0.05$.

first to the fourth factor explained 80.0% of total variance. By examining the loading coefficients of the variables on each factor, the variables that had high loadings on the same factors were grouped. The larger the factor loading, the stronger the association is between that variable and that factor. The specificity for pneumoconiosis, specificity for large opacities, specificity for pleural plaque and shape differentiation consistency for small opacities were found to be loaded significantly on the Factor 1. The sensitivity for pneumoconiosis, sensitivity for large opacities loaded largely on the Factor 2. The sensitivity for pleural plaque loaded largely on the Factor 3. The profusion increment consistency loaded predominantly on the Factor 4.

A factor score is a composite score based on each variable's contribution to the factor. Each factor score of individual examinee was calculated by the regression method. The equation for calculating factor score is shown as follows[14]:

$$F_j = \beta_{j1}Z_1 + \beta_{j2}Z_2 + \beta_{j3}Z_3 + \ldots + \beta_{j8}Z_8 = \sum_{i=1}^{8} \beta_{ji} \times Z_i, (i = 1, 2, \ldots, 8)\ (j = 1, 2, \ldots, m)$$

F_j represents the factor score of the jth factor. β_{ji} represents the factor score coefficient for the ith variable.

Z_i is the value of the ith standardized variable. $Z_i = (X_i - \bar{x}_i)/S_i$, X_i is the observed value of ith variable, S_i is the standardized deviation of variable X_i, $\bar{x}_i$ is the mean of ith variable over all observations. m is the number of the factors, m is less than or equal to the number of variables.

Factor scores were compared by the Bonfferoni multiple comparisons method in One way ANOVA test between each other of the three groups by SPSS 16.0. Table 3 shows that there was a significant difference in the Factor 2 scores between the A1-Group and B-Group, A2-Group and B-Group ($p<0.05$). There was no significant difference for the other factor scores between each other of the three groups.

Factor analysis is an analytic technique that permits the reduction of a large number of interrelated variables to a smaller number of latent or hidden dimensions. The variables that are highly correlated are likely influenced by the same factors, while those that are relatively uncorrelated are likely influenced by different factors[11]. Each factor is interpreted as a latent characteristic of the individuals

revealed by the original variables[15], the original variables are expressed as linear combinations of the factors[16].

We reduced the 8 indices into 4 factors by factor analysis. Accordingly, we can make an interpretation of 4 factors as reflecting 4 different aspects of the reading skill on pneumoconiosis chest films: Factor 1 reflects the proficiency for recording negative parenchymal and negative pleural findings; Factor 2 reflects the proficiency for recording positive parenchymal findings including small and large opacities; Factor 3 reflects the proficiency recording positive pleural findings; Factor 4 reflects the proficiency as to profusion increment consistency alone.

The presence or absence of pneumoconiosis is determined by the cut-off point of profusion 1/0[17]. If more films with profusion equal to or more than 2/1 than 1/1 or 1/2 are included in the exam films, the sensitivity for pneumoconiosis by examinee is easily increased, which mimics great proficiency. Thus high sensitivity or high specificity for pneumoconiosis alone fails to associate with high profusion increment consistency. The factor analysis actually showed that the profusion increment consistency was an independent factor. If examinees originally have high profusion increment consistency, they can necessarily and comprehensively achieve both high sensitivity and specificity for pneumoconiosis. In order to obtain good profusion increment consistency, it requires the examinee to make accurate comparison of all profusions on a 12-point scale with those on the standard films.

Pleural plaque cannot necessarily be seen even in asbestosis patient, while some patients present with the pleural plaque without the parenchymal abnormalities. In our current factor analysis, there was no close relationship between the sensitivity for parenchymal abnormalities and the sensitivity for pleural plaque. It is reasonable that sensitivity for pleural plaque was seen as an independent factor.

After summarizing the 8 indices, the calculation of factor scores for each factor for individual can be helpful to simplify assessment for the proficiency of examinee[18]. The factor score of >0 of individual examinee imply that the proficiency in this aspect was better than the average proficiency of the Examinee Group, and the factor score of <0 imply that the proficiency of examinee was worse than the average proficiency of the Examinee Group. Use of factor score could identify whether the individual proficiency was worse or better than the average proficiency of Examinee Group at each aspect. And it could be helpful in deriving a comprehensive evaluation of the achievement of examinees and making comparison of the proficiency between each other of the three groups.

Factor analysis showed that the Factor 2 scores in the A1-Group and A2-Group were significantly higher than those in the B-Group, which were consistent with the results as shown in Table 2 in our previous literature that the sensitivity for pneumoconiosis of A2-Group, and the sensitivity for large opacities of both A1-Group and A2-Group were higher than those in the B-Group[1]. This indicated that A1-Group and A2-Group tended to identify much more parenchymal abnormalities than the B-Group.

One limitation of this study was that, as to the shape index, there were 20 films with purely rounded small opacity (R/R) subjected, while there were only 4 films with purely irregular small opacity (IR/IR) subjected. Since more films in the exam were in association with rounded opacities than with irregular opacities, recording for absence of small opacities (specificity for pneumoconiosis) and identifying of rounded opacities against irregular opacities might have become effective in the same factor, i.e., factor 1. Therefore including more films with irregular small opacity for the shape index may be appropriate in the future AIR Pneumo Program.

In conclusion, four factors could reflect four aspects of reading proficiency of pneumoconiosis X-ray, and factor scores as well as the 8-index could show differences in attained skills. The 60-film set providing 8-index and 4-factor was suggested to assess reading proficiency of physicians appropriately.

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