

## 근로환경조사 자료의 활용에 관한 고찰

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### The Korean Working Conditions Survey (KWCS): a review on the utilization of the survey database

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#### ABSTRACT

**Objectives:** The Korean Working Conditions Survey(KWCS), which has been conducted five times over the past 13 years, presents a diverse picture of Korean workers across occupations, genders, and age groups. This study summarized the use of KWCS and explored how to make the most of the KWCS by reviewing published peer-reviewed journal articles employing the KWCS data.

**Methods:** Articles were selected in accordance with PRISMA protocol for a systematic literature review. A total of 155 articles were included in this review.

**Results:** The number of articles utilizing KWCS data has been increasing by year. The articles were published in 40 Korean journals and 16 international journals. The journals were mainly in the field of occupational safety and health and sociology. Keywords of mental health, working conditions survey, workforce, health, exposure to risk factor, and working time were mainly highlighted. The articles were grouped by the goals of the KWCS as stated in the survey. The majority of published articles(129 articles, 83%) aimed to 'analyze relationships between different aspects of working conditions'. Fifteen articles(10%) were intended to 'identify groups at risk and issues of concern'. The number of articles to 'monitor trends' were limited.

**Conclusions:** The findings underline the limited utilization of the KWCS. Attention to the range and scope of utilization of KWCS should be developed to address current challenges in occupational health and safety management and policy issues.

**Key words:** Korean Working Conditions Survey(KWCS), literature review, occupational health and safety(OHS) policy


## I. 서 론


우리나라 근로환경조사(Korean Working Conditions Survey, KWCS)는 안전보건공단 산업안전보건연구원이 “산업안전보건 정책수립을 위한 기초자료 수집”을 목적으로 2006년부터 시작한 국가 조사사업으로, 유럽의 근로환경조사(European Working Conditions Surveys, EWCS)를 벤치마킹하였다.

KWCS의 근간인 EWCS는 1990년부터 5년 주기로 유럽연합 기구인 Eurofound(European Foundation for the Improvement of Living and Working Conditions)에서 수행하고 있다. EWCS는 “1) 유럽 전 역의 노동자와 자영업자의 노동조건을 평가 및 정량화 (Assess and quantify working conditions of both employees and the self employed across Europe on a harmonised basis)”, “2) 노동조건들 간의 관계

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분석(Analyse relationships between different aspects of working conditions), “3) 위험그룹 및 우려 이슈 식별(Identify groups at risk and issues of concern as well as of progress), “4) 이러한 문제에 대한 동질적 지표를 제공하여 추세 모니터링(Monitor trends by providing homogeneous indicators on these issues), “5) 특히 노동의 질과 고용 문제에 대한 유럽 정책 개발에 기여(Contribute to European policy development in particular on quality of work and employment issues.)”를 목적으로 한다. EWCS는 유럽 각국 내지 유럽연합의 정책 수립을 위한 기초자료로 활용되고 있다. 가장 최근에 수행된 조사는 제6차 EWCS(2015)이며, 35개국(유럽연합 28개국, 유럽연합 5개 후보국, 노르웨이, 스위스)의 노동자 43,850명(국가별 약 1,000명-3,300명씩 할당)을 대상으로 하였다. 조사 항목은 고용상태, 노동시간, 업무 구성, 교육 및 훈련, 물리적 및 심리사회적 위험 요인, 안전보건, 일과 삶의 균형, 노동자 참여, 소득 및 재정 안정, 건강 등이다(Eurofound, 2017).

KWCS는 2006년에 통계청 승인을 받아 1차 조사가 수행되었으며, 만 15세-64세 취업자 약 1만 명을 대상으로 하였다. 이후 2010년에 2차 조사가 수행되었고, 조사 대상은 만 15세 이상 취업자 약 1만 명이였다. 2011년에 실시된 3차 조사부터 조사 대상이 만 15세 이상 취업자 약 5만 명으로 대폭 확대되었으며, 조사 주기도 3년으로 단축되었다. 현재 2014년 4차 조사, 2017년 5차 조사까지 실시되었고, 2020년에는 6차 조사가 수행될 예정이다. KWCS는 산업안전보건 정책수립의 기초자료 수집을 위해 “1) 상이한 측면의 근로 조건들 간 관계를 분석”, “2) 관심 사항과 위기에 처한 그룹뿐만 아니라 진행 분야 파악”, “3) 시간 경과에 따른 추세 모니터링”을 통해 변화하는 근로환경에 적합한 안전보건정책 수립에 공헌하는 것을 세부 목표로 하고 있다. 조사 항목은 노동력 구조, 근무형태, 작업시간, 작업환경, 작업속도, 작업특징, 교육 및 훈련, 조직의 의사소통, 업무상 사고 및 질병, 직업만족도 등이다(OSHRI, 2017).

이처럼 KWCS는 근로환경의 다양한 영역과 안전보건 관련 사항을 다룬 고유의 정보원으로, 우리나라 안전보건 수준을 다각도로 파악할 수 있다. 또한 원시자료의 공개와 논문경진대회와 같은 공개 플랫폼을 통하여 자료의 활용을 다각화하고 있기 때문에, 다양한 정책적 활

용이 가능하다. 그 결과로 KWCS 자료를 활용한 연구들이 꾸준히 발표되고 있다. 그러나 13년 동안 5차례에 걸쳐 수행된 KWCS의 활용성과를 정리한 사례는 없다. 따라서 본 연구는 KWCS 자료 활용성과를 정리하고, KWCS의 목적에 부합한 자료 활용의 방향성을 제안하고자 하였다.

## II. 대상 및 방법

체계적인 문헌 검토를 위해 PRISMA 가이드라인(Moher et al., 2009)에 따라 KWCS 자료를 활용한 선행 논문을 고찰하였다(Figure 1). 국내 데이터베이스 학술연구정보서비스(RISS)와 국외 데이터베이스 PubMed를 이용하였다(검색 일자: 2019년 3월 5일). 검색 기간은 KWCS가 처음 시작된 2006년부터 2019년까지로 설정하였고, 검색어는 “근로환경조사”, “Korean Working Conditions Survey”, “Korean Working Condition Survey”, “KWCS”로 하였다. 논문을 누락시키지 않기 위해 검색 영역은 “모든 영역(all field)”으로 하였고, 논리연산자 “OR”를 이용하여 검색어를 포함하고 있는 모든 문헌을 추출하였다.

국내 데이터베이스를 통해 245편이 검색되었고, 국외 데이터베이스에서는 76편으로 총 321편의 문헌이 검색되었다. 이 중 데이터베이스 간 중복 검색된 79편을 제외한 242편에 대해 1) 동료심사(peer-review)를 거친 학술논문, 2) KWCS 자료를 직접 활용한 연구 2가지 조건을 모두 만족시키는 문헌을 추출하였다. 1차로 학위논문과 학술대회 발표자료 87편을 제외하였고, 2차로 문헌의 제목과 초록 검토를 통해 KWCS 자료를 직접 사용하지 않았다고 판단되는 문헌을 제외하고자 하였으나, 이에 해당하는 문헌은 없었다. 그 결과 총 155편의 논문이 최종 분석에 포함되었다.

선정된 논문 155편을 출판년도, 수록 학술지, 활용한 KWCS 자료 차수, 저자 키워드, KWCS 세부 목표로 나누어 분석하였다.

## III. 결과 및 고찰

### 1. KWCS 자료 활용 논문의 년간 발표 동향

KWCS 자료를 활용한 논문은 2019년까지 총 155편으로, 2009년에 처음 발표된 이래 해마다 증가하는 추세를 보였고, 최근에 수행된 조사 자료일수록 활용 논문

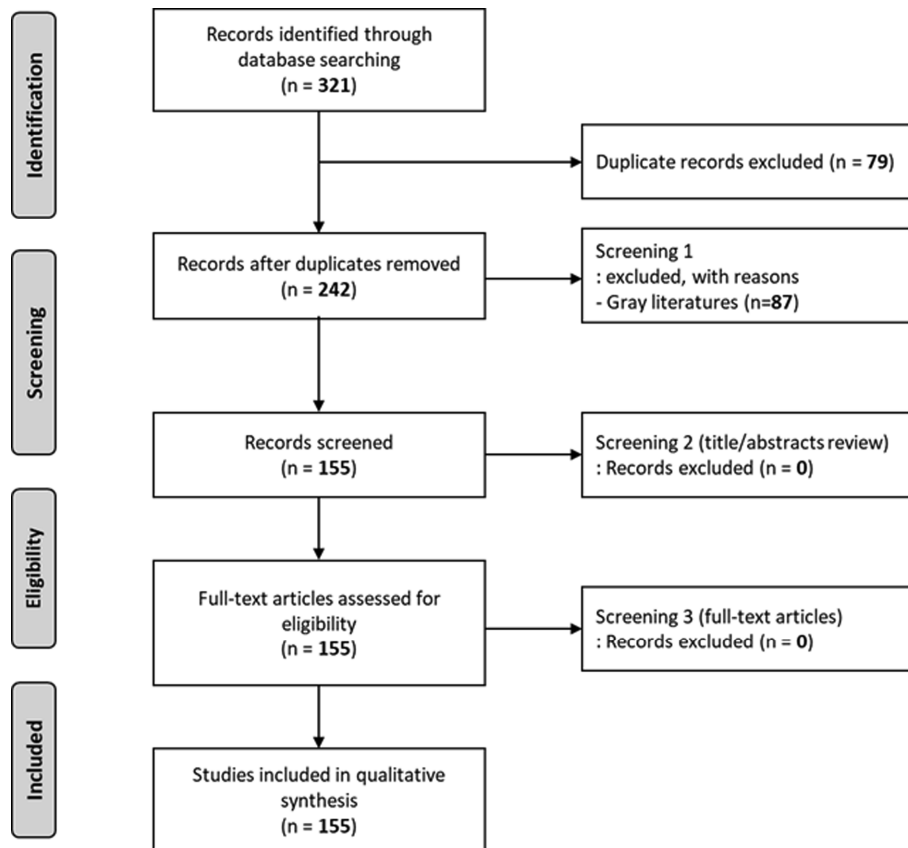


Figure 1. Selection flow chart for the systematic review.

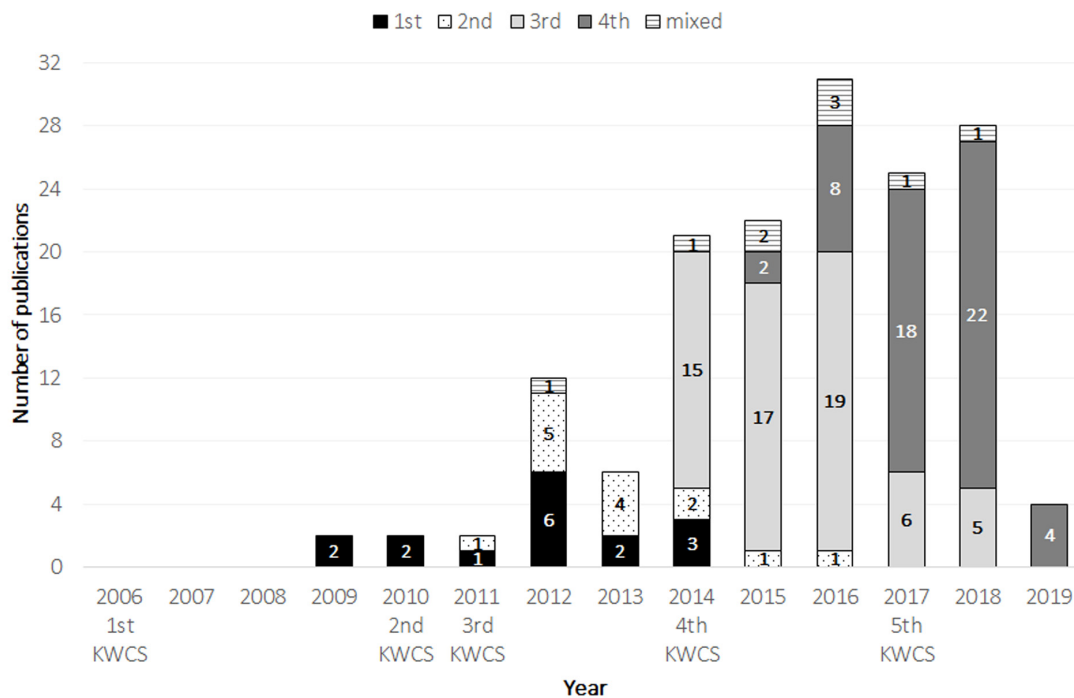


Figure 2. Number of publications by the year (different colors indicate the data set used for publication).

이 늘어났다. 2006년부터 2019년까지 KWCS 자료를 활용한 논문의 연간 발표 편수는 Figure 2와 같다. 특히 2014년에 논문 편수가 급증하였는데, 이는 같은 해에 시작한 안전보건공단 주최 “근로환경조사 논문경진대회”의 영향으로 보인다. 가장 많은 논문이 발표된 시기는 2016년으로 31편의 논문이 발표되었다.

논문에 활용된 KWCS 자료를 조사사업 차수별로 분석한 결과, 자료의 활용이 해마다 증가하는 추세를 보였으나, 자료의 활용이 활발해지기까지 조사사업 종료 후 2-3년 정도의 간격이 있었다. 2006년에 수행된 1차 조사 자료는 2009년부터 활용되기 시작하였고, 16편의 논문이 발표되었다. 2010년에 수행된 2차 조사 자료는 2011년부터 14편의 논문에 활용되었다. 2011년에 수행된 3차 조사 자료는 3년 뒤인 2014년부터 62편의 논문에 활용되었으며, KWCS 자료 중 가장 많이 활용되었다. 2014년 4차 조사 자료는 2015년부터 54편의 논문에 활용되었고, 2017년 5차 자료를 활용한 논문은 현재까지 없었다. 또한 여러 차수의 자료를 함께 활용한 논문은 2012년부터 해마다 1편 이상씩 꾸준히 발표되고 있지만, 총 9편으로 적은 편이었다. 이는 조사사업의 결과가 단면연구에 주로 활용이 되었고, 근로환경 변화의 추세를 분석하는 용도로는 활용이 제한적이었음을 보여준다.

## 2. 논문 게재 학술지 현황

KWCS 자료를 활용한 논문들은 국내외의 다양한 학술지에 게재되었다. 155편의 논문은 56종 학술지에 게재되었고, 이 중 국내 학술지는 40종에 94편(61%), 국외 학술지는 16종에 61편(39%)의 논문이 게재되었다. 이는 KWCS가 외국의 근로환경과의 비교논문에 활용될 가능성이 높음을 시사한다.

KWCS 관련 논문이 게재된 학술지 목록과 수록 논문 편수는 S1과 같다. 이 중 *Annals of Occupational and Environmental Medicine*이 26편(17%)으로 가장 많았고, 이어서 *한국직업건강간호학회지* 13편(8%), *Safety and Health at Work* 11편(7%), *한국산업보건학회지* 9편(6%), *대한안전경영과학회지* 7편(5%), *보건과 사회과학* 7편(5%), *American Journal of Industrial Medicine* 6편(4%), *Industrial Health* 6편(4%), *International Journal of Environmental Research and Public Health* 5편(3%), *Korean Journal of Occupational and Environmental*

*Medicine* 5편(3%)순으로 많았다. 그 밖에 2종 학술지에 3편씩(4%), 10종 학회지에 2편씩(12%), 34종 학술지에 1편씩(22%)의 논문이 게재되었다. KWCS 자료를 활용한 논문은 주로 안전보건 분야 학술지에 게재되었고(119편, 77%), 사회학 분야 학술지에도 다양하게 게재되었다(36편, 23%).

## 3. 저자 키워드 출현빈도

155편의 논문 중 키워드가 없는 3편의 논문을 제외하고, 총 152편 논문의 키워드를 분석하였다. 총 152편 논문에서 사용된 키워드는 총 660개였고, 논문 한 편당 평균 4.3개(최소 2개, 최대 7개)의 키워드를 사용하였다.

키워드의 출현빈도를 분석한 결과, 정신건강(Anxiety/depression, mental health, well-being, stress 등), 근로환경조사(Working conditions survey, KWCS 등), 노동력구조(employment type, employment status, occupation, job insecurity 등), 건강(health, health status, subjective health, health problems 등), 작업위험요인 노출(Exposure to hazard factor, risk factor 등), 노동시간(working hours, long working hour, shift work 등)에 관한 키워드가 주로 사용되었다(Figure 3).

## 4. KWCS 세부 목표에 따른 자료 활용 현황

KWCS의 목적에 부합하게 자료가 활용되고 있는지를 파악하기 위해, KWCS에서 명시한 세부 목표별로 자료 활용 현황을 파악하였다. KWCS의 세부 목표는 “1) 근로 조건 간 관계 분석(목표 1), 2) 위험그룹 식별 및 우려되는 이슈와 진행영역 파악(목표 2), 3) 시간경과에 따른 추세 모니터링(목표 3)을 함으로써 궁극적으로 근로환경과 산업안전보건에 관한 정책 개발에 공헌하는 것”이다(OSHRI, 2017). 155편의 논문 중 ‘목표 1’에 해당하는 논문은 129편(83%), ‘목표 2’와 관련된 논문은 15편(10%), ‘목표 3’을 위한 논문은 6편(4%)이었다. 명시된 목표와 다르게 KWCS 자료를 활용한 논문은 5편(3%)이었다. 대부분 ‘목표 1’을 위한 연구들에 집중되어 있었고, ‘목표 2’나 ‘목표 3’을 위한 연구는 매우 제한적으로 이루어졌다(Table 1).

### 1) 근로 조건 간의 관계 분석(목표 1)

‘목표 1’에 해당하는 논문 129편을 9개의 연구주제별

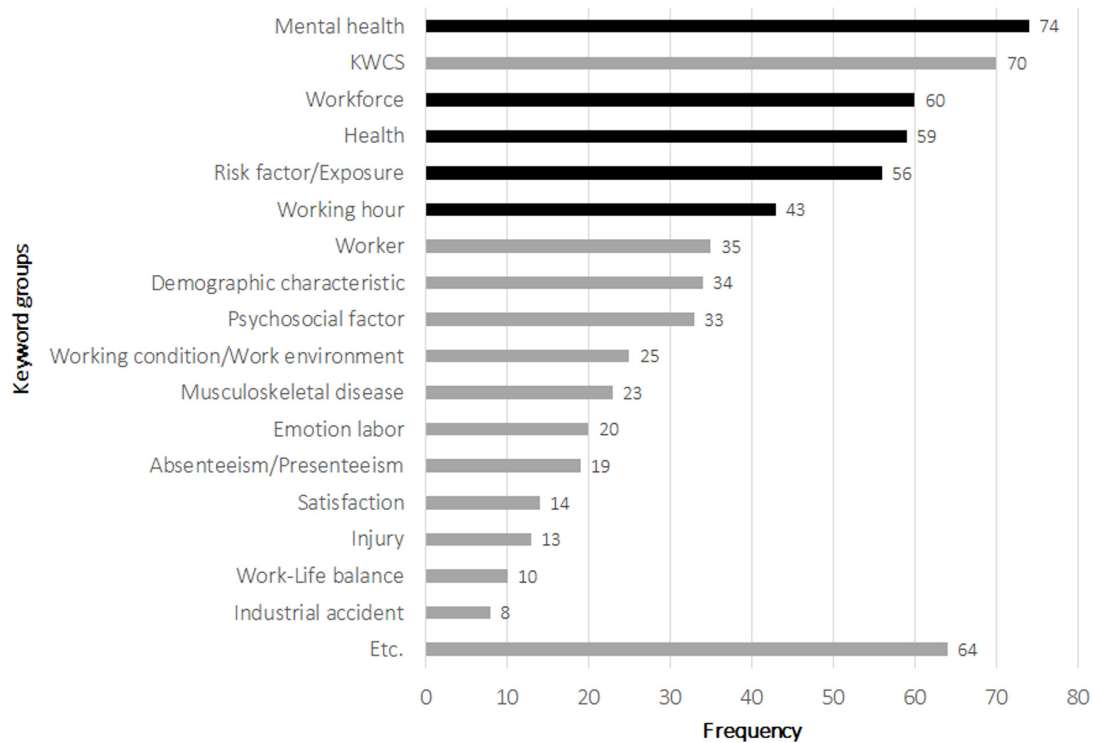


Figure 3. Distribution of author keyword.

Table 1. Number of publications by the KWCS detailed goals and data set

KWCS goals	KWCS data set					Total
	1st	2nd	3rd	4th	Mixed	
Analyze relationships between different aspects of working conditions	15	10	57	44	3	129
Identify groups at risk and issues of concern as well as of progress		3	4	8		15
Monitor trends	1				5	6
Etc.		1	1	2	1	5
Total	16	14	62	54	9	155

로 분류한 결과는 S2와 같다. 사회심리적요인에 관한 논문이 24편으로 가장 많았고, 그 다음으로 건강문제에 관한 논문 22편, 노동시간 20편, 작업위험요인 노출 16편, 노동력구조 15편, 감정노동 10편, 인구학적특성 10편, 일과 삶의 균형 6편, 기타 6편이었다. Figure 4와 같이 KWCS 자료는 전통적인 산업안전보건 주제를 다룬 논문에 꾸준히 활용되고 있었고, 해마다 점차 다양한 주제의 논문에 활용되고 있었다. 특히 2017년부터 일과 삶의 균형을 주제로 한 논문이 발표되었는데, 이는 KWCS가 시대적 동향을 잘 반영하는 용도로 활용되고 있음을 보여준다.

또한 논문의 주요한 변수들은 원인으로서 독립변수로

사용되기도 하고, 결과로서 종속변수로 사용되기도 하였다. 예를 들어 사회심리적요인에 대한 24편의 논문 중 11편이 직장 내 폭력이나 차별에 관한 것으로, 근로조건 간의 관계는 Figure 5와 같다. 8편의 논문은 직장 내 폭력 및 차별이 원인이 되어 건강문제(근골격계질환 증상, 심리적 안녕감(well-being), 수면장애, 우울/불안 등)에 미치는 영향을 파악하였고(Choi et al., 2010; Min et al., 2014; Yoo et al., 2015; Yoon et al., 2015; Lee et al., 2016; Yoo T, 2016; Lee et al., 2017a; Lee et al., 2017b), 3편의 논문은 직장 내 폭력 및 차별이 결과가 되어 이에 미치는 원인(직무스트레스, 노동시간, 고용불안, 근무패턴, 성과평가 등)을 파

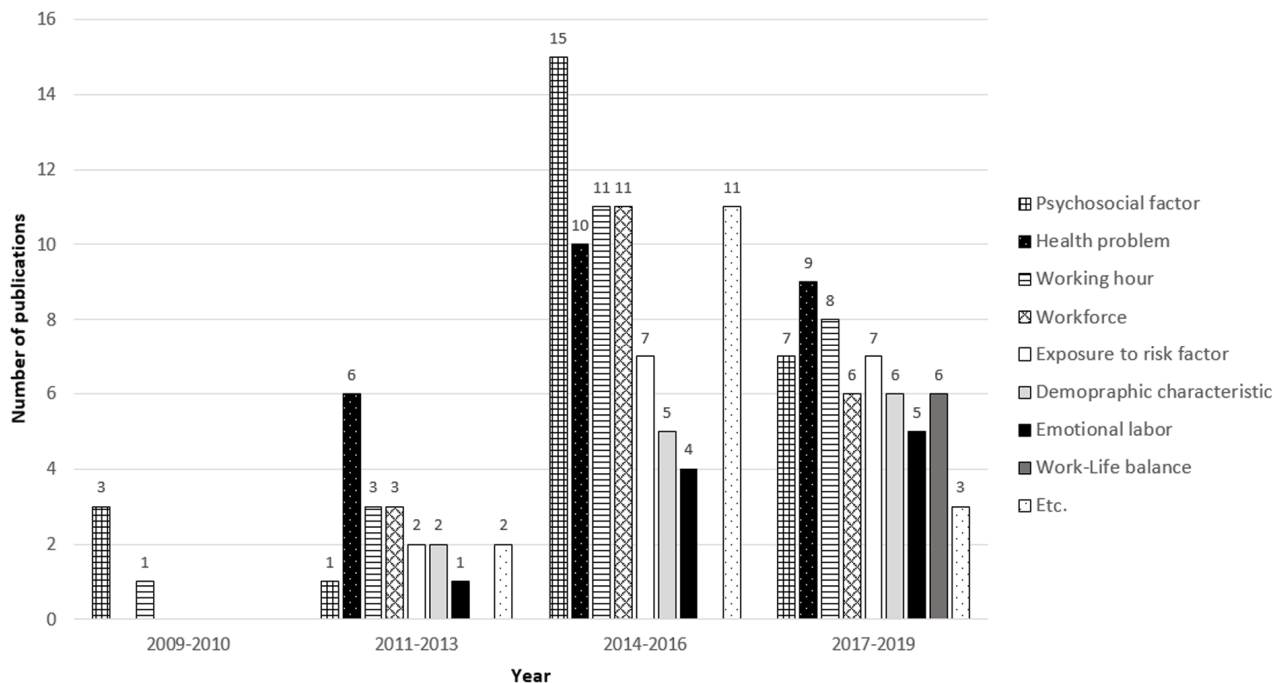


Figure 4. Number of publications on the 'Analyze relationships between different aspects of working conditions (Goal 1)' by the topics.

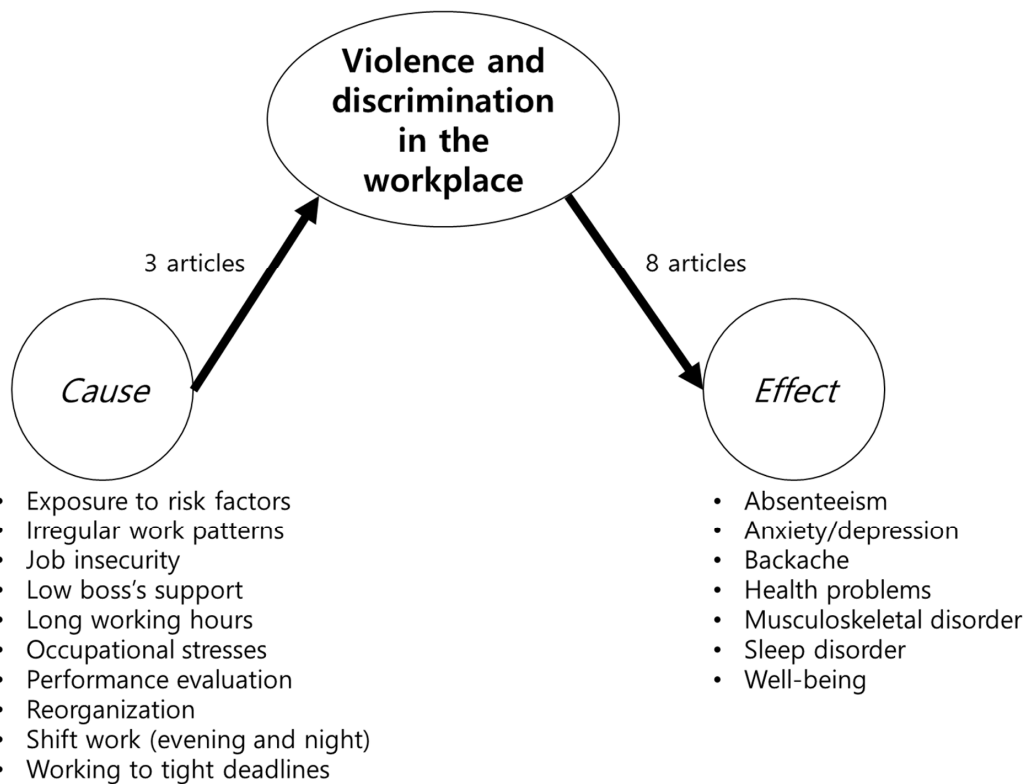


Figure 5. Example of relationship between variables of publications on 'Analyze relationships between different aspects of working conditions (Goal 1)'.

악하였다(Lee et al., 2014; Kang et al., 2017; Song & Kim, 2017). 이는 직장 내 폭력 및 차별을 관리하면 건강문제들을 예방할 수 있고, 기존 연구들에서 확인된 요인들을 관리하면 직장 내 폭력 및 차별을 예방하는 정책 수립에 KWCS 자료의 활용이 가능함을 보여준다. 향후 정책수립 시 이런 연구들을 참고하여 직장 내 폭력을 예방하거나 그로 인한 건강문제를 예방할 수 있을 것이다.

## 2) 위험그룹 식별 및 우려되는 이슈와 진행 영역 파악 논문(목표 2)

‘목표 2’에 해당하는 논문은 15편으로, 위험그룹을 식별한 논문은 5편, 우려되는 이슈와 진행 영역을 파악한 논문은 10편이었다. 위험그룹 식별의 결과로 산업안전보건분야의 취약계층 발굴을 위한 근로환경 실태 지표화, 기후변화에 취약한 직종, 고용형태별 위험노출 등의 차이, 근골격계질환 위험도가 높은 업종이 확인되었다(Kim & Jo, 2014; Kim, 2015; Lee & Ahn, 2016; Moon et al., 2017; Park et al., 2018a). 이런 결과를 활용하여 정책 시행시 우선적으로 적용해야 할 대상을 선정하거나, 정책의 개입 지점을 명확히 할 수 있을 것이다. 또한 안전보건 분야에서 우려가 계속 제기되고 있는 대상이나 주제에 대한 연구에 KWCS 자료가 활용되었다. 그 결과 고령노동자, 자영업자, 영세기업(5인 미만 사업장), 사내하청 노동자, 택배원 등의 근로환경 실태나 산업안전보건 특성(Kim & Rhee, 2012; Kim et al., 2014; Kim, 2016; Park & Kim, 2016; Cheong et al., 2016; Park et al., 2017a; Park et al., 2018b; Lee, 2019), 농업인의 손상규모(Ko et al., 2012), 최근 유병율이 높은 건설업 종사자의 상지 근골격계증상(Cho et al., 2018)이 확인되었다.

## 3) 추세 모니터링 논문(목표 3)

‘목표 3’에 해당하는 논문은 우리나라 노동시간 및 노동조건의 변화를 평가하고(Park et al., 2012; Kim et al., 2015; Kim et al., 2016a; Park et al., 2017b), 유럽과 노동조건을 비교한 것이 있었다(Park & Lee, 2009; Kim & Cho, 2014). KWCS가 13년 동안 5차례에 걸쳐 조사가 이루어졌음에도 불구하고, 근로환경 변화에 대한 평가가 매우 제한적으로 이루어져왔다. 시간에 따른 변화를 평가하는 것뿐만 아니라, 새로운 정책 도입의 효과를 확인하는 용도로 KWCS 자료를 활용할 수 있을 것이다. 예를 들어 내년에 수행될 예정인 제6차 KWCS 자료로 작년과

올해 새롭게 도입된 “주 52시간 근무(2018.07.01. 시행)”, “고객응대근로자 보호(2018.10.18. 시행)”, “직장 내 괴롭힘 금지(2019.07.16. 시행)”의 제도 시행 전후 비교를 통해 정책의 효과를 확인할 수 있을 것이다.

## 5. KWCS의 정책적 활용 방안

현재 우리나라의 산업안전보건 정책 및 산재예방을 위한 국가 조사사업은 KWCS 뿐만 아니라 산업안전보건실태조사와 작업환경실태조사가 있다. 산업안전보건실태조사는 2018년부터 3년 마다 사업장을 대상으로 노동방식, 위험요인, 안전보건조직 및 활동, 업무변화, 안전의식 등을 조사하는 것으로, 2002년부터 2015년까지 3년 주기로 실시되었던 산업안전보건동향조사에서 발전한 것이다(OSHRI, 2019). 작업환경실태조사는 1993년부터 5년 주기로 사업장(산업재해보상보험에 가입된 사업장에 한함)의 화학물질 취급현황, 위험기계/기구 및 설비 보유현황, 유해 작업환경 요인 등을 조사한다(KOSHA, 2019). KWCS의 활용성결과를 정리한 결과, 산업안전보건실태조사와 작업환경실태조사와 차별되는 강점이 파악되었고, 다양한 정책적 활용의 가능성을 확인하였다.

첫째, KWCS는 사업장 단위가 아닌 취업자 개인을 대상으로 한 조사로, 직업 분포를 파악할 수 있기 때문에, 직업별 사고 및 질병 발생, 유해인자 노출 등을 파악할 수 있다. 그러나 현재까지 KWCS가 산업안전보건 분야에서 잘 다뤄지지 않았던 직업을 세분류(4-digit)까지 조사한 강점이 있으나, 직업 변수의 활용은 매우 제한적으로 이루어졌다. 직업을 주요한 변수로 활용한 논문은 4편뿐이었고, 모두 대분류 직업(1-digit)만을 활용하였다(Kim, 2015; Kim & Lee, 2015; Kim et al., 2015a; Park et al., 2017c). 그 외에 14편의 논문은 대분류(1-digit)나 세분류(4-digit) 수준에서 직업 변수를 활용하였으나, 특정 직업군을 대상으로 하기 위해 직업 변수를 활용했을 뿐이었다(Ko et al., 2012; Shin et al., 2012; Kim & Lee, 2015; Kim & Kim, 2015; Kim et al., 2016b; Lee, 2016; Lee & Kim, 2016; Lee & Lee, 2016; Jung et al., 2017; Choi & Jeon, 2017; Choi et al., 2017; Jeong I et al., 2018; Cho et al., 2018; Lee, 2019). Park et al. (2013)은 외국 사례 고찰을 통해 우리나라 산업안전보건분야와 국민질병감시체계에서 표준직업분류 도입의 필요성을 주장하였다. 우리나라는 산업안전보건활동에

서 표준직업분류를 활용한 사례는 드물 뿐만 아니라, 대분류 직업만을 활용하여 사고와 질병의 원인 규명 및 예방에 한계가 있다고 보고하였다. 우리나라 산업재해는 대분류 직업에 따라 분석을 하고 있는데, 이는 광범위하게 분류된 9개의 직업 대분류(관리자, 전문가 및 관련 종사자, 사무 종사자, 서비스 종사자, 판매 종사자, 농림어업 숙련 종사자, 기능원 및 관련 기능 종사자, 장치/기계조작 및 조립종사자, 단순노무 종사자)가 직무와 직업의 유사성의 거의 없어 산업재해의 구체적인 원인 파악에 한계가 있다고 지적하였다. 또한 외국의 사례와 연구를 근거로 제시하며, 우리나라 산업안전보건 활동에서 직업을 유해인자 노출, 사고 및 질병 발생 위험을 감시할 수 있는 주요한 변수로 활용할 것을 제안하였다.

둘째, 조사 대상에 자영업자까지 포함함으로써 우리나라 취업자의 대표성 있는 통계를 제공하기 때문에, 산업재해현황에서 파악하지 못하는 건강문제의 규모나 위험집단 등을 파악할 수 있다. 이런 강점에도 불구하고 KWCS의 활용은 제한적으로 이뤄져왔다. 위험그룹 식별에 활용된 경우는 5편, 자영업자를 대상으로 한 경우는 1편뿐이었다. 기존의 산업재해예방 사업의 대부분은 사업대상 선정시 산업재해 통계 정보에 기반하고 있다. 이런 사업들은 산업재해를 줄이기 위한 목적을 갖고 있어 산업재해 특성에 따라 전략을 수립하며, 산업재해가 발생한 산업이나 노동자 집단을 대상으로 한다. 그러나 산업재해 통계 정보는 산업재해보상보험법에 의해 업무상 질병으로 인정된 경우만 해당되고, 법의 가입 대상에 해당되지 않는 노동자는 포함되지 않아 모집단이 제한되는 한계가 있다(Hong et al., 2011; OSHRI, 2012). 향후 제도 내에서 보호받지 못하거나, 고위험군에 속하는 취약계층을 위한 정책수립시 KWCS 자료가 유용하게 활용될 수 있을 것이다.

셋째, 조사 주기가 짧아 동향을 반영한 정책 개발이 가능하고, 추세 모니터링을 통해 정책의 효과를 확인하는 것이 가능하다. KWCS는 조사 주기가 3년으로 짧기 때문에, 우리나라 산업구조 및 환경의 급격한 변화를 감지할 수 있는 최신의 정보를 파악할 수 있다. 특히 최근 서비스업의 발달과 다양한 고용형태로 인해 산업안전보건정책의 사각지대에 놓여있는 노동자들의 산업재해예방 정책수립에 KWCS 자료를 활용할 수 있다. 또한 새로운 정책 도입 후, KWCS 자료의 비교 분석을 통해 정책의 효과를 확인할 수 있을 것이다.

넷째, 기존의 다른 국가조사사업과의 연계가 가능하

다. 유럽의 사례를 보면, Eurofound는 EWCS 뿐만 아니라 유럽 사업장 조사(European Company Survey, ECS), 유럽 삶의 질 조사(European Quality of Life Survey, EQLS)와 같은 사회학적인 조사를 함께 수행하여 정책을 위해 자료를 종합적으로 활용하고 있다. 이 조사들은 유럽연합 전역의 삶의 질과 노동조건에 대한 비교 정보의 출처를 제공하며, 조사 자료의 상세한 분석을 통해 새로운 동향을 파악할 뿐만 아니라 유럽 정책의 중심적인 문제에 대해 깊이 고찰한다. 또한 조사별 보고서에 그치지 않고, 주제별 보고서를 발간하고 있다. 여기에는 특정 활동 영역에 대한 대표 보고서, 연구 프로젝트의 요약보고서, 정책 기초 및 토론과 관련된 수치를 제시하는 정책 개요가 포함된다. 또한 블로그 기사, 유럽 노동 생활에 관한 정기 기사, 연구에 배경 자료를 제공하는 논문, 정책 입안자들의 임시 요청으로 인해 발간되는 보고서 등도 발간한다(Eurofound, 2018). 이에 비해 우리나라는 KWCS만을 수행하고 있어 한계가 있으나, 산업안전보건실태조사, 작업환경실태조사 등 현재 우리나라에서 수행하고 있는 다른 국가조사사업과의 연계가 가능하다. 세 조사 모두 표준산업분류를 사용하고 있어, 산업 변수를 활용하면 세 조사의 결과를 연결하여 정책수립의 기초자료로서 활용할 수 있을 것이다. 향후 KWCS와 기존의 다른 조사사업과의 연계 방안 강구를 통해 정책수립을 위한 종합적인 자료 활용이 필요하다.

마지막으로, 기존 연구들에서 공통적으로 지적하고 있는 단면적 자료이기 때문에 인과관계를 확인할 수 없다는 점(Park et al., 2012; Kim & Lee, 2015; Kim & Yoon, 2017; Jung et al., 2017; Hyun, 2018; Park et al., 2018b; Park et al., 2018c)과 응답자의 자기보고식 결과이기 때문에 회상편견이 발생할 수 있고, 건강문제의 경우에는 의사의 의학적 진단결과가 아니라는 제한점이 있다는 점(Hong et al., 2011; Oh et al., 2011; Kim et al., 2012; Kim & Kwon, 2012; Kim et al., 2015; Moon et al., 2017; Song & Kim, 2017; Cho et al., 2018; Park et al., 2018b; Park et al., 2018c)은 향후 KWCS 자료를 활용한 분석결과를 해석할 경우 유의해야 할 것이다.

## V. 결 론

본 연구는 13년 동안 5차례에 걸쳐 수행된 KWCS 자료의 활용성과를 정리하였다. 이를 통해 산업안전보



건 정책수립을 위한 KWCS의 목적에 부합하고, KWCS의 강점이 드러나는 자료 활용의 방향성을 제안하고자 하였다. 그 결과, KWCS는 개인을 대상으로 산업안전보건분야에서는 다루기 어려웠던 직업을 세분류(4-digit)까지 파악하였다는 점, 조사 대상에 자영업자까지 포함함으로써 우리나라 취업자의 대표성 있는 통계라는 점, 조사사업의 주기가 3년으로 짧기 때문에 우리나라 산업구조 및 환경의 급격한 변화를 감지할 수 있는 최신의 정보를 파악할 수 있다는 강점이 파악되었다. 향후 연구에서는 KWCS를 활용하여 1) 직업별 사고 및 질병과 위험요인 노출 파악, 2) 산업재해현황에서 파악하지 못하는 건강문제의 규모나 위험집단 파악, 3) 동향을 반영한 정책 개발 및 추세 모니터링을 통한 정책의 효과를 확인할 수 있을 것이다.

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#### <저자정보>

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**S1.** List of journal titles publishing KWCS-related articles and the number of publications

Country	Journal	N*
Korea	Korean Journal of Occupational Health Nursing	13
	Safety and Health at Work	11
	Journal of Korean Society of Occupational and Environmental Hygiene	9
	Journal of the Korea Safety Management and Science	7
	Health and Social Science	7
	Korean Journal of Occupational and Environmental Medicine	5
	Journal of Korean Academy of Community Health Nursing	3
	J Korean Academy of Nursing	2
	Journal of the Korea Convergence Society	2
	Journal of the Korean Society of Safety	2
	Journal of the Korea Contents Association	2
	The Korean Journal of Health Service Management	2
	Korean Journal of Labor Economics	2
	Journal of the Korean Medical Association	1
	Journal of Korean Medical Science	1
	Journal of Digital Convergence	1
	Journal of Korean Public Health Nursing	1
	Journal of the Korea Academia-Industrial cooperation Society	1
	Journal of the Korean Data & Information Science Society	1
	Journal of the Korean Data Analysis Society	1
	Journal of the Korean Data and Information Science Society	1
	Korean Journal of Audiology	1
	Korean Public Health Research	1
	The Journal of Korean Society of Occupational Therapy	1
	The Korean Journal of Applied Statistics	1
	The Women's Studies	1
	Science of Emotion and Sensibility	1
	Policy Studies	1
	Quarterly Journal of Labor Policy	1
	Korean Society of Gerontological Social Welfare	1
	Health and Social Welfare Review	1
	Dispute Resolution Studies Review	1
	Korean Journal of Social Issues	1
	Korean Journal of Industrial Relations	1
	Korean Journal of Labor Studies	1
	The Journal of Industrial Innovation	1
	Journal of applied reliability	1
	The Korean Journal of Economic Studies	1
	Korean Journal of Social Welfare Research	1
	Korean Journal of Sociology	1
Foreign country	Annals of Occupational and Environmental Medicine	26
	American Journal of Industrial Medicine	6
	Industrial Health	6
	International Journal of Environmental Research and Public Health	5
	Journal of Occupational and Environmental Medicine	3
	Chronobiology International	2
	International Archives of Occupational and Environmental Health	2
	Journal of Occupational Health	2
	PLOS ONE	2
	Annals of Work Exposures and Health	1
	International Journal of Behavioral Medicine	1
	International Journal of Occupational Safety and Ergonomics	1
	Journal of International Medical Research	1
	Social Science & Medicine	1
	WORK: A Journal of Prevention, Assessment & Rehabilitation	1
	Workplace Health & Safety	1
Total		155

\*Number of publications

S2. List of articles on the 'Analyze relationships between different aspects of working conditions (Goal 1)' by the topics

Topics	Authors	Title	Journal
Psychosocial factor	1 Cho YS et al.	The association between Korean workers' presenteeism and psychosocial factors within workplaces	Ann Occup Environ Med 2016;28
	2 Choi ES & Ha Y	Work-related stress and risk factors among Korean employees	J Korean Acad Nurs 2009;39(4):549-561
	3 Choi ES et al.	The influence of workplace violence on work-related anxiety and depression experience among Korean employees	J Korean Acad Nurs 2010;40(5):650-661
	4 Choi ES & Jeon GS	The impacts of psychosocial work environments on depressive symptoms among Korean registered nurses	Korean J Occup Health Nurs 2017;26(1):30-39
	5 Choi ES et al.	The association between psychosocial work environment and depressive symptoms among Korean teachers	J Korean Acad Community Health Nurs 2017;28(4):463-471
	6 Kang SH et al.	What causes the experience of discrimination in non-regular workers?	Ann Occup Environ Med 2017;29
	7 Kang SU et al.	Association between supervisors' behavior and wage workers' job stress in Korea: analysis of the fourth Korean working conditions survey	Ann Occup Environ Med 2017;29
	8 Kim G et al.	The association of relational and organizational job stress factors with sleep disorder: analysis of the 3rd Korean working conditions survey (2011)	Ann Occup Environ Med 2016;28
	9 Kim K et al.	The impact of job quality on health status and job satisfaction	J Korea Saf Manag Sci 2015;17(3):185-193
	10 Kim YS et al.	Distribution of hypertension according to working conditions among Korean worker	J Korean Soc Occup Environ Hyg 2014;24(4):556-565
	11 Lee B et al.	Gender differences in psychosocial working conditions and psychological well-being among Korean interactive service workers	Korean J Occup Health Nurs 2015;24(2):132-141
	12 Lee BJ et al.	Psychosocial factors and psychological well-being: a study from a nationally representative sample of Korean workers	Ind Health 2016;54:237-245
	13 Lee HE et al.	Work-related risk factors for workplace violence among Korean employees.	J Occup Health 2014;56:12-20
	14 Lee HS et al.	The association between perceived discriminations and well-being in Korean employed workers: the 4th Korean working conditions survey	Ann Occup Environ Med 2017;29
	15 Lee N et al.	Perceived discrimination and low back pain among 28,532 workers in South Korea: Effect modification by labor union status	Soc Sci Med 2017;177:198-204
	16 Lee SH et al.	The association between perceived discrimination and depression/anxiety disorders among Korean workers: analysis of the third Korean Working Conditions Survey	Ann Occup Environ Med 2016;28
	17 Lu et al.	Workplace psychosocial factors associated with work-related injury absence: a study from a nationally representative sample of Korean workers	Int J Behav Med 2014;21(1):42-52
	18 Min et al.	Workplace injustice and self-reported disease and absenteeism in South Korea	Am J Ind Med 2014;57:87-96
	19 Park et al.	Organizational factors associated with work-related sleep problems in a nationally representative sample of Korean workers	Int Arch Occup Environ Health 2013;86:211-222
	20 Rhee KY & Park WY	Sickness absence and job satisfaction	J Korea Saf Manag Sci 2014;16(4):203-213
	21 Song M & Kim J	The effects of work environment characteristics on workplace bullying in Korea	Dispute Resolution Studies Review (drsr) 2017;15(2):37-71
	22 Yoo et al.	Gender and educational level modify the relationship between workplace mistreatment and health problems: a comparison between South Korea and EU countries	J Occup Health 2015;57:427-437
	23 Yoo et al.	Relationship of workplace violence and perpetrators on sleep disturbance-data from the 4th Korean working conditions survey	Ann Occup Environ Med 2016;28
	24 Yoon et al.	The relationship between experience of workplace violence and musculoskeletal pain among wage workers in South Korea	J Korean Soc Occup Environ Hyg 2015;25(2):211-219

S2. List of articles on the 'Analyze relationships between different aspects of working conditions (Goal 1)' by the topics (continued)

Topics	Authors	Title	Journal
Health problem	1 Baek JH et al.	Relationship between comorbid health problems and musculoskeletal disorders resulting in musculoskeletal complaints and musculoskeletal sickness absence among employees in Korea	Saf Health Work 2015;6(2):128-133
	2 Choi S et al.	Exposure to adverse social behavior in the workplace and sickness presenteeism among Korean workers: the mediating effects of musculoskeletal disorders	Int J Environ Res Public Health 2018;15:2198-2212
	3 Hong et al.	The prevalence of work related sickness absences according to the second Korean Working Condition Survey	Korean J Occup Environ Med 2011;23(4):428-438
	4 Hyun HS	Associations between working conditions and Occupational injury of Korean Employees	Journal of Digital Convergence 2018;16(12):523-531
	5 Kim CB & Kim KS	Association of work-related characteristics and hypertension among white collar workers	J Korean Soc Occup Environ Hyg 2015;25(3):418-427
	6 Kim CB & Ko J	Effect of the health behaviors on subjective sleep problems in an employees	The Journal of the Korea Contents Association 2015;15(6):337-345
	7 Kim HG et al.	The effect of working environment of manufacturing workers on health condition	Journal of the Korean Data & Information Science Society 2018;29(6):1555-1563
	8 Kim J & Chang SJ	The relation between job stress and health problem according to working condition	Health and Social Science 2012;31:5-24
	9 Kim KS & Kwon OJ	Prevalence and risk factors of hearing loss using the Korean working conditions survey	Korean J Audiol 2012;16(2):54-64
	10 Kim YS et al.	A study on the relations between low back pain and working conditions among Korean employees	J Korean Soc Occup Environ Hyg 2012;22(2):107-118
	11 Kim YS & Lee KJ	Issues Involving Workers in Industrial Safety and Health in Accordance with Development of Knowledge Economy	Journal of the Korean Data Analysis Society 2015;17(3):1347-1359
	12 Kwon MJ & Choi E	Regional Factors on the Self-rated Health of Wage Workers	J Korean Acad Community Health Nurs 2018;29(1):21-32
	13 Lee BJ et al.	The relationship between working condition factors and well-being	Ann Occup Environ Med 2014;26
	14 Lee G	Korean emotional laborers' job stressors and relievers: focus on work conditions and emotional labor properties	Saf Health Work 2015;6(4):338-344
	15 Lee J & Lee B	Physical and psychosocial risk factors affecting mental health and presenteeism among South Korean hairdressers	Korean J Occup Health Nurs 2016;25(4):290-299
	16 Lee SG et al.	Risk factors for absenteeism due to work related musculo-skeletal disorders among Korean employees	Korean J Occup Environ Med 2012;24(3):239-251
	17 Lee Y & Kim HL	Influences of working conditions and health status on absence due to sickness in health and medical related workers	Korean J Occup Health Nurs 2016;25(3):216-226
	18 Park B & Oh Y	The association between working condition with depression among wage workers	Health and Social Science 2018;47:31-56
	19 Park J et al.	Association of job satisfaction and security with subjective health and well-being in Korean employees.	J Occup Environ Med 2018;60(10):e525-e532
	20 Park JH et al.	Associations between physical factors and working conditions and occupational injuries among Korean workers	J Korean Soc Occup Environ Hyg 2015;25(3):405-417
	21 Park JN et al.	Prevalence of depressive symptoms and related factors in Korean employees: the third Korean Working Conditions Survey (2011)	Int J Environ Res Public Health 2016;13
	22 Shin KS et al.	Prevalence and risk factors of work-related low back pain among operators and drivers of transportation vehicle	Korean J Occup Environ Med 2012;24(1):11-19

**S2.** List of articles on the ‘Analyze relationships between different aspects of working conditions (Goal 1)’ by the topics (continued)

Topics	Authors	Title	Journal
Working hours	1 Baek C et al.	The association between Korean employed workers' on-call work and health problems, injuries	Ann Occup Environ Med 2018;30
	2 Cho SS et al.	The combined effect of long working hours and low job control on self-rated health: an interaction analysis	J Occup Environ Med 2018;60(5):475-480
	3 Jeon SH et al.	Association among working hours, occupational stress, and presenteeism among wage workers: results from the second Korean Working Conditions Survey	Ann Occup Environ Med 2014;26
	4 Jeong I et al.	Irregular work schedule and sleep disturbance in occupational drivers—a nationwide cross-sectional study	PLoS One 2018
	5 Jung J et al.	Association between working time quality and self-perceived health: analysis of the 3rd Korean working conditions survey (2011)	Ann Occup Environ Med 2017;29
	6 Kim BH & Lee HE	The association between working hours and sleep disturbances according to occupation and gender	Chronobiol Int 2015;32(8):1109-1114
	7 Kim CB et al.	Association night-shift and long working-hours effects on subjective insomnia in Korean workers: the third Korean Working Conditions Survey	The Korean Journal of Health Service Management 2015;9(1):41-55
	8 Kim J	The relationship between frequency of injuries and workplace environment in Korea: focus on shift work and workplace environmental factors	Saf Health Work 2018;9(4):421-426
	9 Kim JY	Mismatches between actual and preferred working-time and work environment satisfaction of workers in Korea	The Journal of Industrial Innovation 2016;32(3):229-257
	10 Kim YS et al.	2014 Korea Working Conditions Survey data analysis	Journal of applied reliability 2015;15(3):181-191
	11 Lee HE et al.	Weekend work and depressive symptoms among Korean employees	Chronobiol Int 2014;32(2):1-8
	12 Lee JG et al.	The association between long working hours and work-related musculoskeletal symptoms of Korean wage workers: data from the fourth Korean working conditions survey (a cross-sectional study)	Ann Occup Environ Med 2018;30
	13 Lee KH et al.	Long working hours and emotional well-being in Korean manufacturing industry employees	Ann Occup Environ Med 2013;25
	14 Lee YK	The effects of working hour reduction on workers' lifestyle and working conditions	The Korean Journal of Economic Studies 2015;63(2):37-64
	15 Lee YK	Analysis of the relationship between working hour mismatch and worker's health	Health and Social Welfare Review 2015;35(3):135-165
	16 Lim SJ et al.	The Effect of Subjective Overwork on Health: Moderate Effect of Risk Perception	Journal of the Korean Society of Safety 2017;32(6):116-124
	17 Park J et al.	Weekly work hours and stress complaints of workers in Korea	Am J Ind Med 2010;53:1135-1141
	18 Park S et al.	Association between night work and cardiovascular diseases: analysis of the 3rd Korean working conditions survey	Ann Occup Environ Med 2015;27
	19 Park TJ et al.	The Relationship between Shift Work and Work-related Injuries among Korean Workers	Korean J Occup Environ Med 2012;24(1):52-60
	20 Rhee KY et al.	Under and over employment and working conditions	J Korean Soc Occup Environ Hyg 2014;24(4):536-546
Exposure to risk factor	1 Heo YS et al.	Association between workplace risk factor exposure and sleep disturbance: analysis of the 2nd Korean Working Conditions Survey	Ann Occup Environ Med 2013;25
	2 Kim CB et al.	Musculoskeletal workload and job stress in early childcare teachers	The Korean Journal of Health Service Management 2016;10(2):205-216
	3 Kim HC et al.	Association of active and passive smoking with occupational injury in manual workers: a cross-sectional study of the 2011 Korean working conditions survey.	Ind Health 2015;53:445-453
	4 Kim J et al.	The relationship between occupational noise and vibration exposure and headache/eyestrain, based on the fourth Korean Working Condition Survey (KWCS)	PLoS One 2017

S2. List of articles on the 'Analyze relationships between different aspects of working conditions (Goal 1)' by the topics (continued)

Topics	Authors	Title	Journal
Exposure to risk factor	5 Kim JY et al.	Relationship between simultaneous exposure to ergonomic risk factors and work-related lower back pain: a cross-sectional study based on the fourth Korean working conditions survey	Ann Occup Environ Med 2018;30
	6 Kim T et al.	Computer use at work is associated with self-reported depressive and anxiety disorder.	Ann Occup Environ Med 2016;28
	7 Kim SJ et al.	Association between second-hand smoke and psychological well-being amongst non-smoking wagedworkers in Republic of Korea	Ann Occup Environ Med 2016;28
	8 Kim YS & Rhee KY	The effect of computer using work hours on work-related symptom experiences	J Korea Saf Manag Sci 2014;16(3):219-229
	9 Lee S et al.	Symptoms of nervous system related disorders among workers exposed to occupational noise and vibration in Korea	J Occup Environ Med 2017;59(2):191-197
	10 Lee W et al.	Relationship between exposure to second-hand smoke in the workplace and occupational injury in the republic of Korea.	Ann Work Expo Health 2018;62(1):41-52
	11 Oh JI et al.	Association between physical workload and work-related back pain: a nationwide study	Korean J Occup Environ Med 2011;23(3):298-308
	12 Park H et al.	Second hand smoke exposure in workplace by job status and occupations	Ann Occup Environ Med 2019;31
	13 Park MY et al.	Association of exposure to chemicals with dyspnea among employed workers: analysis of the 3rd Korean Working Conditions Survey	J Korean Soc Occup Environ Hyg 2016;26(1):64-74
	14 Park SJ et al.	Influence of physical and musculoskeletal factors on occupational injuries and accidents in Korean workers based on gender and company size	Int J Environ Res Public Health 2019;16(3)
	15 Park WY	The effect of the exposure to hazard factors on job satisfaction in employees	J Korea Saf Manag Sci 2014;16(3):257-266
	16 Seo JI et al.	Relationship between occupational injuries and the provision of safety and health information: data from the 4th Korean working conditions survey	
Workforce	1 Choi ES	Health inequalities among Korean employees	Saf Health Work 2017;8(4):371-377
	2 Ha Y & Park H	Effect of job insecurity on job related depression and anxiety: large- and small-sized company employees	Korean J Occup Health Nurs 2016;25(4):329-339
	3 Kim JH & Lee CW	A Study on the actual condition of work environment and work morale according to the employment type of service workers	Sci Emot Sensib 2017;20(2):103-116
	4 Kim JY et al.	Who is working while sick? nonstandard employment and its association with absenteeism and presenteeism in South Korea	Int Arch Occup Environ Health 2016;89:1095-1101
	5 Kim MS et al.	Presenteeism among self-employed workers: Korean working conditions survey	Ann Occup Environ Med 2014;26
	6 Kim YS	The influence that labor market flexibility exerts on worker health	Health and Social Science 2014;36:201-222
	7 Kwon K et al.	Association between employment status and self-rated health: Korean working conditions survey	Ann Occup Environ Med 2016;28
	8 Lee WW et al.	Association between work-related health problems and job insecurity in permanent and temporary employees	Ann Occup Environ Med 2013;23
	9 Min KB et al.	Subcontractors and increased risk for work-related diseases and absenteeism	Am J Ind Med 2013;56:1296-1306
	10 Park JS & Rhee KY	The type of employment and occupational injuries -based on household survey-	J Korea Saf Manag Sci 2012;14(4):137-145
	11 Park JS & Rhee KY	The perception of precarious workers about ill-health effect of work	Health and Social Science 2014;36:239-262
	12 Park WY	The effect of the exposure to hazard factors on job satisfaction in employees	Health and Social Science 2014;36:183-200
	13 Rhee KY	Analysis of health inequality by the type of employment on health among employees - pathway of the effect via the exposure of hazardous factors -	J Korea Saf Manag Sci 2014;16(2):81-90
	14 Rhee KY et al.	The type of payment and working conditions	Saf Health Work 2015;6(4):289-294
	15 Shin S & Byeon SH	The analysis of risk exposure and ill health symptom by difference depending on the special type of employment	J Korean Soc Occup Environ Hyg 2018;28(3):319-329



**S2.** List of articles on the ‘Analyze relationships between different aspects of working conditions (Goal 1)’ by the topics (continued)

Topics	Authors	Title	Journal
Emotional labor	1 Beak K et al.	The association of workplace psychosocial factors and musculoskeletal pain among Korean emotional laborers	Saf Health Work 2018;9(2):216-223
	2 Jung K et al.	Relationship between concealment of emotions at work and musculoskeletal symptoms: results from the third Korean working conditions survey	Ind Health 2017;55:265-274
	3 Kim WB et al.	Work environment and stress of emotional laborers	Korean Journal of Sociology 2012;46(2):123-149
	4 Lee B	The relationship between emotional working hour and muscle pain	Korean J Occup Health Nurs 2014;23(4):269-276
	5 Lee B	Relationship between hiding emotions and health outcomes among South Korean interactive service workers	Workplace Health Saf 2016;64(5):187-194
	6 Lee B	The effects of customer contact service to the mental health among Korean taxi drivers	Korean J Occup Health Nurs 2016;25(2):108-117
	7 Lim SS et al.	Facing complaining customer and suppressed emotion at worksite related to sleep disturbance in Korea	J Korean Med Sci 2016;31(11):1696-1702
	8 Rhee KY & Park WY	Emotional worker's satisfaction about work environment and work autonomy	Korean Journal of Social Issues 2017;32(2):9-32
	9 Yoon JH et al.	Suppressing emotion and engaging with complaining customers at work related to experience of depression and anxiety symptoms: a nationwide cross-sectional study	Ind Health 2017;55:265-274
	10 Yun S et al.	The role of customer service manual on workplace emotional burden in nationwide cross sectional study.	Ann Occup Environ Med 29:31
Demographic characteristic	1 Cheong S	Employment type, experience of discrimination, and health among young workers: focused on self-rated health and depression/anxiety	Korean Journal of Social Welfare Research 2016;51:197-224
	2 Choi K & Kim H	Study on the factors working environment and health effects of contingent workers youth	The Journal of the Korea Contents Association 2016;16(12):170-180
	3 Hong EY & Kim SD	Health status and affecting factors related to job among Korean women employees	Journal of the Korea Academia-Industrial cooperation Society 2012;13(9):4107-4188
	4 Jeoung J	The effect of sexual harassment on workplace satisfaction and career prospect for women	The Women's Studies 2018;97(2):72-102
	5 Kim E & Yoon JY	Effects of emotional labor and workplace violence on physical and mental health outcomes among female workers: the 4th Korean Working Conditions Survey	Korean J Occup Health Nurs 2017;26(3):184-196
	6 Kim HS et al.	Job stress and mental health of female household head workers	Korean J Occup Health Nurs 2016;25(4):249-258
	7 Kwon MH & Lee JS	The effects of job characteristics and leisure activities participation of elderly workers on health	The Journal of Korean Society of Occupational Therapy 2018;26(2):33-42
	8 Lee B	Effects of working environment and socioeconomic status on health status in elderly workers: a comparison with non-elderly workers	J Korean Acad Community Health 2017;28(4):472-481
	9 Lee KJ et al.	Relationship of activities outside work to sleep and depression/anxiety disorders in Korean workers: the 4th Korean working condition survey	Ann Occup Environ Med 2017;29
	10 Park J et al.	Gender differences in occupations and complaints of musculoskeletal symptoms: Representative sample of South Korean workers	Am J Ind Med 2017;60:342-349
Work-Life Balance	1 Choi ES & Kim J	The association between work-life balance and health status among Korean workers	WORK: A Journal of Prevention, Assessment & Rehabilitation 2017;58:509-517
	2 Jung MS et al.	Factors influencing work-life balance in Korean registered nurses	Korean J Occup Health Nurs 2017;26(2):114-123
	3 Kim YM & Cho SI	Work-life imbalance and musculoskeletal disorders among South Korean workers	Int J Environ Res Public Health 2017;14(11):1331-1343
	4 Kim YM & Cho SI	Associations of family demands and work-life conflict with musculoskeletal disorders among Korean workers	Int J Environ Res Public Health 2018;15:1419-1434
	5 Lee Y	A convergence study on factors influencing work-life balance in foreign workers	Journal of the Korea Convergence Society 2018;9(10):477-485
	6 Yang JW et al.	The work-life balance and psychosocial well-being of South Korean workers	Ann Occup Environ Med 2018;30

**S2.** List of articles on the ‘Analyze relationships between different aspects of working conditions (Goal 1)’ by the topics (continued)

Topics	Authors	Title	Journal
Ⅲ 3	1 Cho HH et al.	The comparison of provision of risk information between employees with labour union and non labour union	J Korea Saf Manag Sci 2014;16(4):257-262
	2 Hyun SH & Kim Y	Associations between working environment and weight control efforts among workers with obesity in Korea	J Int Med Res 2018;46(6):2307-2316
	3 Kim J	Association between working conditions and smoking status among Korean employees	Korean J Occup Health Nurs 2015;24(3):204-213
	4 Lee S & Jeon Y	The effects of high health risky activities including smoking and drinking habits	Korean Public Health Research 2015;41(4):21-35
	5 Lee S & Jeon Y	The network effects of smoking and drinking behaviors on subjective job risk assessment and workplace injuries	Korean Journal of Labor Economics 2016;39(2):83-111
	6 Lee YK	Are adverse working environments adequately compensated in South Korea?	Korean Journal of Labor Economics 2016;39(1):33-55