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A systematic review on noncommunicable diseases among working women

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Abstract: The increasing involvement of women in the paid-labor market has led to multifactorial exposure towards the development of noncommunicable diseases (NCDs). This review aims to identify the prevalence of NCDs and the associated risk factors among working women. A systematic review was performed using PubMed and Scopus databases. Twelve articles published between 2015 and 2019 satisfied the inclusion and exclusion criteria and were selected for qualitative synthesis. Among working women, the prevalence of NCDs was as follows: coronary heart disease, 0.3%–5.9%; metabolic syndrome, 52.0%; diabetes mellitus, 8.9%–16.0%; hypertension, 16.6%–66.4%; non-skin cancer, 3.7%. The prevalence of NCD risk factors was as follows: overweight/obesity, 33.8%–77.0%; low physical activity, 51.0%; unhealthy diet, 44.9%–69.9%; dyslipidemia, 27.8%–44.0%. The factors associated with NCDs were long working hours, double work burden, and stress. NCD is an important burden of working women that will lead to reduced work quality and affect family well-being. Disease prevention approaches, such as the intervention of common workplace risk factors and specific work schedule design, are among the strategies for improving the situation.

Key words: Women, Working, NCD, Burden, Risk factors, Working hours

Introduction

Women's participation in the labor force has been increasing since the early 19th century due to increased education and employment opportunities. To date, more women participate in the paid labor market to improve their family economics and for other societal participation[1]. This phenomenon has altered the traditional role of a woman as a homemaker. Women spend a significant proportion of their time at the workplace and share similar work burdens with their male colleagues. Therefore, the working environment contributes significantly to their daily life, which later affects their health status. According to the World Health Organization, environmental hazardous exposure from living and working environments are the top risk factors for chronic disease mortality[2].

Noncommunicable diseases (NCDs) are currently on the rise, and it is estimated that more than 40 million people globally have NCDs[2]. Among the NCDs are coronary heart diseases, hypertension, diabetes, obesity, cancer, and mental health issues. Unfortunately, NCDs have been the leading cause of death in women in the past 3 decades, with two out of three women dying due to NCDs[3], especially in low- and middle-income countries. It is now understood that NCDs are not exclusive diseases of men. For example,

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heart disease was the number one cause of death in women in the United States in 2017, where 299,578 women died due to heart disease[4]. With the knowledge of this increasing burden, NCDs in women should be managed with specific attention to their risk factors and consequences, as they manifest differently between both sexes. As more women enter the workforce, one strategy is to focus on NCD prevention by providing health education on risk factors at the workplace.

Increasing evidence suggests women become vulnerable in the workplace[4, 5]. Even though women share the working environment with men, they carry a different health risk due to the distinct biological and psychological differences between men and women. Therefore, identifying women's health risks in the workplace can increase understanding of the significance of NCDs among working women to design a sex-specific intervention, which would be more focused and target-specific. A review of previous studies is necessary for increasing our understanding of working women's risks towards NCDs and analyzing the magnitude of the emerging issue. Therefore, the present systematic review aimed to identify the prevalence of NCDs and the associated risk factors among working women.

Subjects and Methods

Search strategy and study selection

A comprehensive search of the literature from PubMed and Scopus was performed on April 1, 2019 to search for relevant studies. The PRISMA (preferred reporting items for systematic reviews and meta-analyses) checklist was used for the publications search workflow. The keywords used were "working women" OR "women labo*r" OR "women employ*" AND "NCD" OR "noncommunicable disease" OR "obesity" OR "overweight" OR "chronic disease" OR "diabetes" OR "ischemic heart disease" AND "prevalence" OR "risk factors", and the limit was set from 2015 to 2019. Articles retrieved from the databases were compiled using Mendeley Desktop version 1.19. Four duplicates with 100% matching were removed by the software automatically. Next, all authors read the title of each article and agreed to exclude articles that did not match the keywords. If there was any doubt, the abstract was retrieved and reread to justify the decision. The abstracts of the articles were distributed among the authors for assessment of the inclusion and exclusion criteria. Then, full articles that had been selected were retrieved and again distributed to the authors. Two authors examined and extracted the data for each article independently. Finally, if there was any disagreement, a third author was consulted.

Inclusion and exclusion criteria

Studies included in the review had to meet the following inclusion criteria: 1) selected studies were observational studies or clinical trials; 2) published from 2015 to 2019; and 3) had working women as the subject. The exclusion criteria were: 1) outcome not related to NCD; 2) review articles; 3) articles not in English; 4) full text of article not available; 5) the article did not involve the working population.

Internet-based search

The PubMed and Scopus searches identified 94 articles. Seven duplicates were removed. Following title and abstract screening and reviewing, 17 potentially relevant articles were identified and retrieved for more detailed evaluation. Of these 17 articles, 12 fulfilled all the inclusion and exclusion criteria and five articles were excluded with reasons. Of the five articles, three were rejected because they were review articles, one was not related to NCD, and one did not involve the working population as the sample. After screening and eligibility assessment steps had been completed, 12 articles were finally included in the qualitative synthesis. Fig. 1 illustrates the detailed PRISMA flow diagram.

Quality appraisal

All papers were subjected to quality assessment using the Mixed Method Appraisal Tool–Version 11 described by Pluye *et al*. (2011)[6]. Eight articles met all the criteria outlined (100%), three articles scored 75%, and one article scored 50%. All papers were included in the review, and the criteria met are detailed in the final column of Table 1.

Results

In total, 12 articles were analyzed to identify the prevalence and risk factors of NCDs among working women. Of the included articles, six were cohort studies, four were cross-sectional studies, one was an intervention study, and one was a qualitative study. Most of the studies had been conducted in high-income countries, namely the United States, Australia, Bahrain, Denmark, and Italy. The other studies had been performed in upper- and lower-middle-income countries (i.e., China, Egypt, the Democratic Republic of the Congo, and South Africa). The sample size of the population in the studies ranged from 57 in an intervention study[7] to 109,358 in a large cohort study[8]. All studies

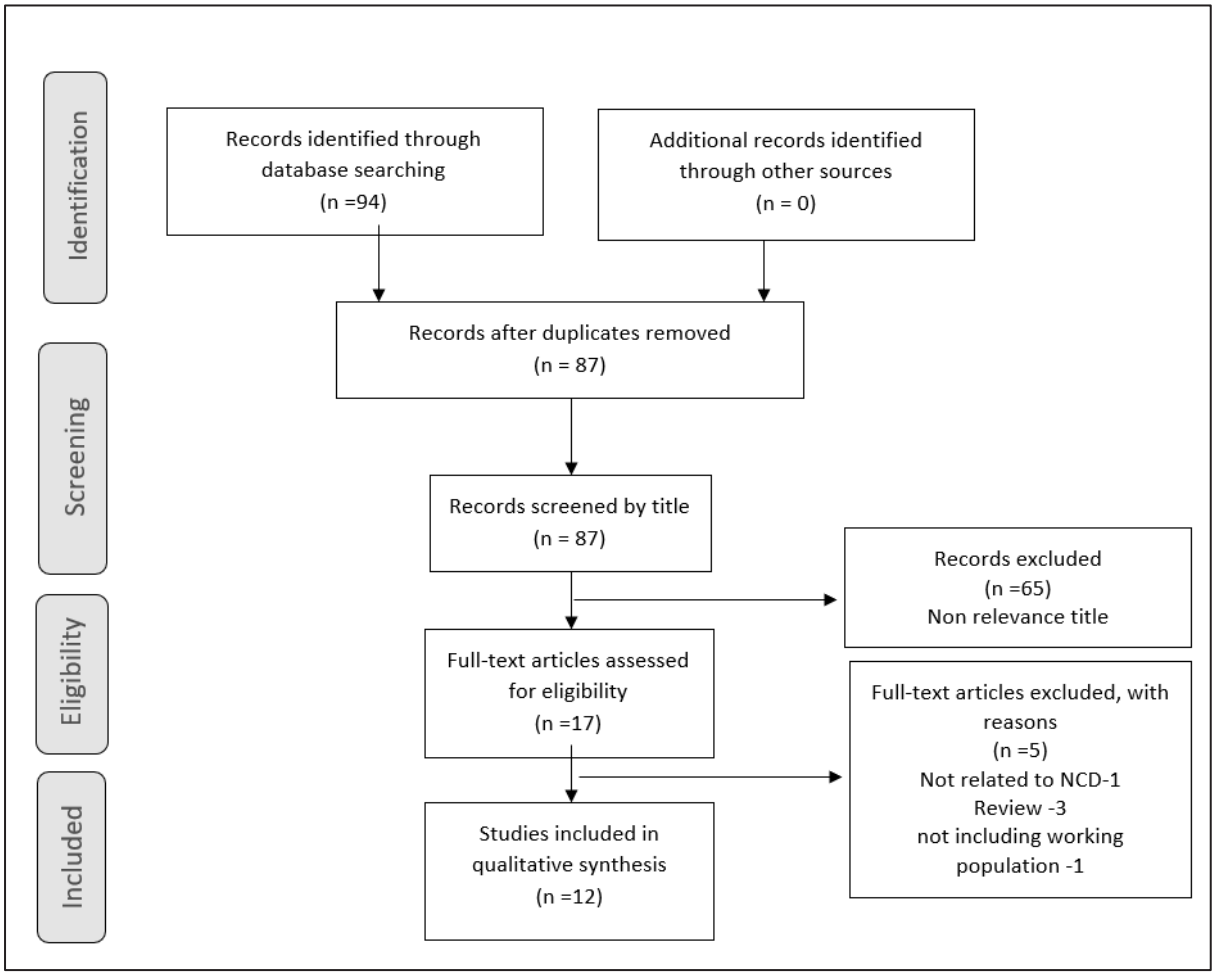

Fig. 1. PRISMA flow diagram of the article selection process [adapted from Moher *et al.* 2009)]

Table 1: Summary of included studies

No	Author, year, country	Study design	Sample size, population	Prevalence	Risk factors/ Odd Ratio		Discussion/Limitation	MMAT score (criteria number met)
1.	(Dembe&You 2016) USA	Cohort	N=7492 respondents, age 46 to 53 years full time worker	-Coronary Heart disease (CHD)-5.8% -Non-skin cancer-3.7% -arthritis- 17.6% -diabetes- 8.9%	-Women working for 41 to 50 hours per week have increased risk of heart disease, arthritis and diabetes - Women working for more than 60 hours per week have increased risk of asthma and non-skin cancer	-OR 1.61 (95%CI 1.13-2.29) for heart disease -OR 1.55 (95% CI 1.25-1.92) for arthritis -OR 1.62 (95%CI 1.20-2.17) for diabetes -OR 3.52 (95% CI 1.38-9.00) for non-skin cancer -OR 2.89 (95%CI 1.46-5.72) for asthma	- Long working hours usually encompassing weekend work and work performed at unusual hours - Early onset of chronic diseases may reduce individuals' life expectancy and quality of life and increase health care costs. - women has greater family responsibilities thus more prone for inter-role conflict -women has poor job control and job monotony	100% (3.1,3.2,3.3,3.4)
2.	(D'ovidio et al. 2015)	Cohort	N=109,358 women age 25-50 years	- CHD; 0.3%	- low CHD risk in employed vs. unemployed women	-(Incidence risk ratio [IRR]=0.79, 95% CI=0.63-	- Women continue to carry out most domestic work and childcare despite	100% (3.1,3.2,3.3,3.4)

	Italy		old			0.99).	working.	
					- increase by number of sons	-(IRR=1.39, 95% CI=1.17-1.66),	- Among those employed the risk of CHD increased by 29% for each child except for those having female children. This is because female children are more engaged in domestic work	
					-≥2 sons	-(IRR=1.93, 95% CI=1.21-3.10).		
					-≥2 sons and ≥2 daughters	-(IRR=8.29, 95% CI=2.01-34.23).		
							- Male children are more likely involve in drug abuse and alcohol. Therefore, women may be overburdened by thinking of their son's deviant behavior as well as their own workload	
3.	Durazo et al. 2018) USA	cohort	N=23,905 of female health professionals in the Women's	Cardiovascular Diseases (CVD); 5.1%	- increased with number of pregnancies. - Job insecurity was associated with an increased risk of CVD	-HR 1.16(95%CI; 1.01–1.33)	- Reproductive factors have been shown to adversely impact general morbidity in late adulthood - Increase parity may	100% (3.1,3.2,3.3,3.4)

			Health Study		events		be associated with physiological alterations on woman's body, such as increased metabolic syndrome, oxidative stress, that might produce inflammation and increased CVD risk	
4.	(Hall et al. 2019) China	qualitative	N=29 participant female Filipino domestic worker in Macau, China	-physical illness (hypertension, diabetes, chronic body pain, extreme fatigue, poor sleep) -mental health issues (depression, anxiety), -addictive (gambling, alcohol misuse)	-limited healthcare access - poor treatment and abuse by employers - lack of privacy - inadequate sleeping areas in employers' homes - financial stress -lack of quality social support	Not Applicable (NA)(qualitative)	- physical and mental health problems indicate the level of vulnerability compounded by the lack of access to resources. -Indebtedness and low salaries limit social mobility - Pervasive mental health problem lead to gambling to cover the debt, suicide, HIV due to sex exchange - Psychosocial and policy-level interventions are needed to improve the	100% (1.1,1.2,1.3,1.4)

						health and wellbeing of this population of migrant women.	
5.	(Al Saweer et al. 2017) Bahrain	cohort	N=97 medical staff	Before intervention: - Overweight/obesity; 67% -morbid obesity;5% - high blood pressure;5% -high fasting blood sugar;20.6% - hypercholesterolemia; 27.8% -vegetable and fruit intake ;18.5%	After: - overweight/obesity;59.7% -morbid obesity; 3% -high blood pressure; 3% -high fasting blood sugar; 9.2% -hypercholesterolemia; 17.5% -vegetable and fruit intake ;60.8%	-average weight loss ranged from 2 kg to 18 kg with a mean of 8.2 kg. - average bp reduction was 5 mmHg systolic and 3 mmHg Diastolic - total cholesterol was reduced by 0.08 mmol/L -consumption of fruits and vegetables increased by 42%.	- The program had a positive health impact.	100% (3.1,3.2,3.3,3.4)

6.	(Hassan et al. 2015) Egypt	cross-sectional	N=138 females at the National Research Centre.	-overweight; 27%, -obesity; 38%	-missing and or infrequent intake of breakfast at home; 60% -frequent consumption of snacks 2 times or more per week; 67.4% - low serving per day of vegetables; 55.1% - fruits; 44.9% - frequent consumption of sweets, fried food - consume pickles; 69.9% - used to add table salt to diet; 87.7%	NA	- Activities that formerly required high energy expenditure have been replaced by the ease offered by urbanization and industrial and technological progress -A national plan of action to overcome obesity is urgently needed to reduce its economic and health burden	50% (4.1,4.3)
7.	(Majeed et al. 2015) Australia	cohort	N=11,551 women from the 1946–1951 birth cohort of Australian Longitudinal Study on Women's	-Chronic diseases (diabetes, asthma, depression and arthritis) were less prevalent in women classed ''mostly in paid work.	- transitioned in and out of paid work	-OR 1.44 (95%CI; 1.14-1.81) -OR1.8 (95% CI 1.55-2.08)	- Workforce participation patterns were significantly associated with diabetes, asthma, depression, and arthritis -women who were	100% (3.1,3.2,3.3,3.4)

			Health.				previously in paid work but who increasingly moved out of paid work, potentially due to caring responsibilities, financial security, other life course, ageing and health related factors.	
8.	(Mentoor et al. 2018) South Africa	cross-sectional	N=128 female farm workers	-Metabolic Syndrome (MetS);52% -high waist circumference (WC);68.8 -high blood pressure (BP);66.4% -low High-Density Cholesterols (HDL-c) levels;64.1% presenting with elevated TG levels 25.8% with elevated FBG n = 33 (25.8%)	-Women in MetS shows higher Body Mass Index (BMI), WC, lower HDL-c and higher triglycerides (TG), higher BP, however higher fasting insulin (not significant)	Not measured	The prevalence of the MetS and its individual risk factors were found to be significantly high in this female farm worker population. -MetS, body shape and/or both could predict differences in body composition, physiological and biochemical parameters in women	75% (3.1,3.2,3.3)

9.	(Pedersen et al. 2016) Denmark	Cross sectional	N=88 sex workers	-daily smoking; 65.9% -binge drinking; 46.6% --marijuana; 46.8%	-smoking -alcohol -substance use	-smoking (OR: 7.9; 95% CI: 4.8–13.1) -binge drinking (OR:2.8;95% CI: 1.8-4.6) -marijuana (OR: 12.7; 95% CI: 7.4-21.9)	- marked increases in women brothel workers compared to Danish women in rates of smoking alcohol consumption, and drug use as well as being underweight.	100% (3.1,3.2,3.3,3.4)
10.	(Mawaw et al. 2017) Democratic Republic of the Congo	Cross sectional	n=175 females Mining workforce	-Overweight;20.6% -Obesity;13.2% -Diabetes;16.0% -Hypertension;16.6% -CVD; 4.6%	- exposure and/or inhalation to one or more chemicals (acid, sulfur, pesticides and other chemicals, vapors and smoke);23% - exposure to physical hazards (noises or vibrations); 48.5%	Not measured	-Mining is a relatively hazardous activity, both in terms of potential injuries and deaths, but also increased risk for developing NCDs -Various risk factors (environmental, lifestyle, etc.) associated with mining have been implicated in the increased occurrence of NCDs.	100% (3.1,3.2,3.3,3.4)
11.	(Low et al. 2015) Northern	Unblinded Randomized controlled	N=57 health care workers	-overweight or Obese; 77%	Intervention: weekly motivational communications on CVD	the intervention group resulted in greater:	Statistically not significant due to small sample size	75% (2.1,2.3,2.4)

	Carolina	trial	women - -	-dyslipidemia;44% -no exercise; 51%	risk	- weight loss (7.2 vs 3.8 pounds) -stress reduction (6.5 vs 4.7; Cohen stress scale); -increase exercise days per week (1.4 vs 1.2).	
12.	(Moller 2016) Denmark	Cohort study	N=11996	-Ischemic heart disease (IHD); 4.25%	Sedentary work	RR 0.93 (0.82–1.06	This study could not confirm the hypothesis that sedentary work is a distinct risk factor for IHD. Future studies may further investigate the association with objective measures of occupational sitting time

75%

(3.1,3.2,3.3)

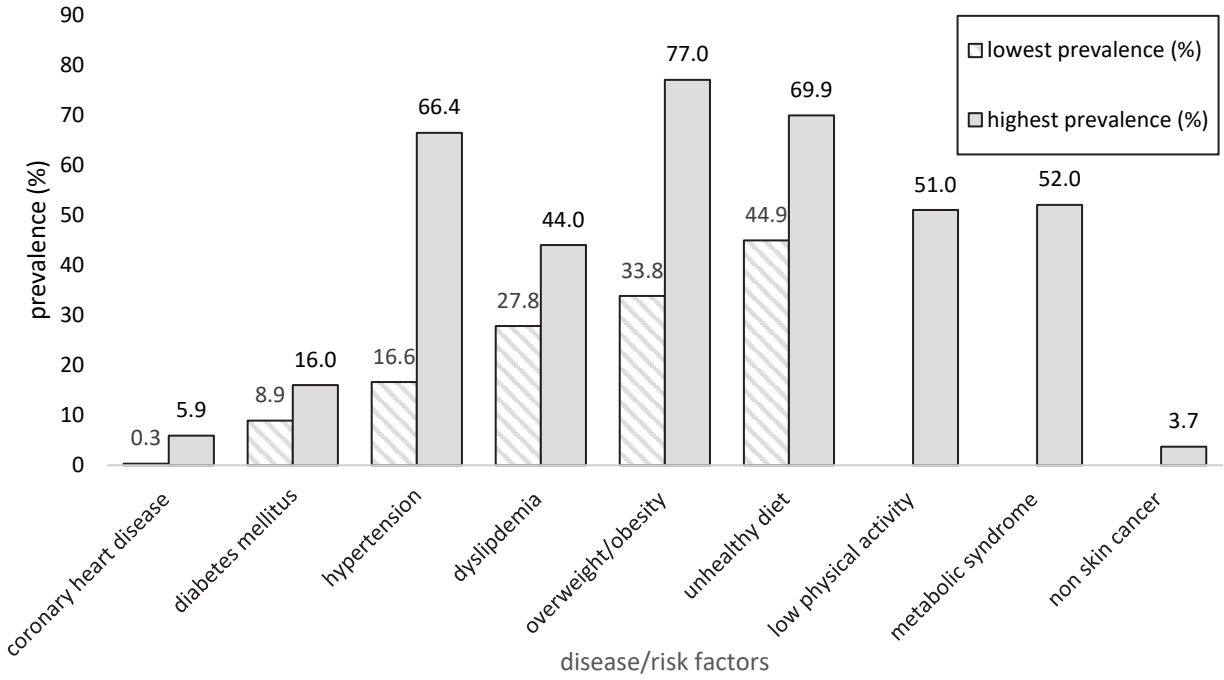

Fig. 2. : The prevalence of non-communicable diseases and risk factors among working women in the included studies.

involved working women aged 18–63 years.

Fig. 2 presents the prevalence of NCDs and their risk factors from the included studies, showing a high prevalence of common NCDs risk factors, particularly overweight and obesity, unhealthy diet, and lack of physical activity. Four studies reported the prevalence of coronary heart disease. In those studies, the prevalence of coronary heart disease in working women ranged from 0.3%[8] to 5.8%[9]. Exposure to long working hours for many years was a significant risk factor for coronary heart disease, as women who worked 41–50 hours per week had 1.6 times higher odds of developing coronary heart disease compared to women who worked 31–40 hours per week[9]. The risk for cardiovascular disease increased by 23% for each son, where having ≥2 sons presented a higher risk of cardiovascular disease compared to having <2 sons or ≥2 daughters (incidence rate ratio [IRR]=1.93, 95% confidence interval [CI]: [1.21, 3.10]). However, if a working woman had ≥2 sons and ≥2 daughters, the risk of cardiovascular disease was further increased (IRR=8.29, 95% CI: [2.01, 34.23])[8].

A few studies specifically investigated metabolic syndrome among working women. The prevalence of obesity in these studies ranged from 33.8%[10] to 77%[7], whereas the prevalence of diabetes ranged from 8.9%[9] to 16.0%[10]. Working for 41–50 hours per week was also a significant risk factor for diabetes (odds ratio [OR]=1.62, 95% CI: [1.20, 2.17]). High blood glucose prevalence ranged from 20.6%[11] to 25.8%[12], and the prevalence of hypertension ranged from 3% to 16.6%[10]. Other studies included the prevalence of chronic body pain, arthritis, mental health issues, and non-skin cancer[13].

Two studies examined the association of chronic NCDs with employment participation and transition from paid to unpaid work[13]. More than half of the studies focused on specific groups of occupations: healthcare workers (three studies), Filipino domestic workers, national research center workers, farmworkers, mining workforces, and sex workers in Denmark in one qualitative study. In addition to common NCD risk factors, Filipino domestic workers were also exposed to stressful conditions such as poor treatment and abuse by employers, lack of privacy and sleeping areas, and financial stress, which can lead to mental health problems[15]. This was worsened by inadequate access to healthcare services and poor social support by their families. Among sex workers, the most significant NCD risk factors were smoking and alcohol and drug abuse[14]. Table

1 summarizes the characteristics of each study, the prevalence and risk factors of NCDs, and the limitations and discussion of the included studies.

Discussion

This review aimed to identify the prevalence and risk factors of NCDs among working women. NCDs warrants attention from all stakeholders, as they are preventable. The present review compiled common NCDs that represent the burden on women's health at work, namely coronary heart disease, diabetes mellitus, hypertension, metabolic syndrome, and mental health issues. The common risk factors were also highlighted, such as obesity, low physical activity, and an unhealthy diet.

The risk of coronary heart disease in working women was related to their job burden. This included long working hours and the demands of domestic responsibilities at home[8, 9]. Women shoulder double workloads due to their traditional roles at home (i.e., managing chores and child-rearing)[15]. In a developed country, D'Ovidio *et al*.[8] found that the risk of coronary heart disease in women increased with greater numbers of offspring. A possible explanation is the increased stress from the burden that working mothers must endure. Psychosocial stress may activate the potential pathological pathways, such as increased hypercoagulability state, and increase inflammation, which later triggers maladaptive behaviors and further activates the autonomic nervous system and induces hypercortisolism[16]. Consequently, the symptoms of coronary heart disease will affect work performance and productivity due to increased sick leave or even lead to loss of productive labor due to the high mortality of the disease[19]. Therefore, the occupation-related risk factors of coronary heart disease should be identified earlier and must not be overlooked among these women. The preventative measures include early detection by regular cardiovascular screening, risk identification, risk assessment, and prompt disease treatment.

The rapid increase in the prevalence of overweight and obesity among women has also been an alarming issue. Many studies conducted in different countries also found an association between body weight and the working environment[17–19]. The present review found that women's jobs and their work and home lifestyles have a great impact on their body weight. For example, sex workers were less likely to be overweight due to the nature of their job[14]. Meanwhile, lifestyle factors, such as unhealthy diet and sedentary lifestyle, had been observed among obese and overweight female employees in a research center in Egypt[20]. Nevertheless, emerging controlled trials have been conducted in the workplace to reduce obesity. Among the interventions are combining health education and physical activity and regular motivational communications, which have had a positive impact on participants. This highlights the fact that the workplace can be a strategic location for weight management programs, which can benefit working women's health.

Metabolic syndrome, characterized by features of hyperglycemia, visceral obesity, atherogenic dyslipidemia, and hypertension, is well linked to cardiovascular disease[21]. Among the cardiometabolic risk factors were unhealthy dietary intake patterns. For instance, a study reported female employees with poor diet quality had a 1.8 times higher risk of cardiometabolic diseases compared to those who had the healthiest diets, mainly due to long working hours (i.e., >49 hours per week) and job strain[22]. Besides, obesity has also been associated with low serum vitamin D levels in women working nonmanual jobs, probably due to the increased indoor activity and limited physical activity during working hours. Women who worked indoors in nonmanual jobs also had limited sun exposure and a sedentary lifestyle that leads to obesity, increased total cholesterol (CHOL), low-density lipoprotein (LDL) cholesterol, and LDL to high-density lipoprotein (HDL) (LDL/HDL) and CHOL/HDL ratios, and subsequently increased metabolic syndrome[23].

During the industrialization era, women became psychologically vulnerable in their job environments. For example, a qualitative exploration by Hall *et al*. revealed that female migrants who worked as domestic workers were exposed to mental health problems, such as anxiety and depression, due to lack of resources and support[24]. Elsewhere, sex workers were exposed to high-risk behaviors, such as alcohol and recreational drug consumption, to keep up with the demands of the job[14]. Therefore, these groups of working women should never be left out of any NCD intervention agendas to ensure equity and equality for a healthy life. More health promotion should be delivered to self-employed women to help prevent mental health problems in the future. Meanwhile, within larger organizations, women were also exposed to stress due to long and unusual working hours. One factor could be due to women having poor job control and job monotony. Furthermore, work–family conflict elevates job stress more among female workers[25].

From the studies included, we identified few NCD risk factors among working women, including low physical activity and sedentary lifestyle and poor dietary habits, such as skipping breakfast, frequent snacking, junk-food

consumption, and low intake of vegetables and fruits. Job demands such as long working hours, double work burdens and workplace stress, poor welfare, and abuse by employers were identified as risk factors of NCDs. Therefore, workplace interventions could be implemented to reduce the burden of NCD risks in this population. Employers should prioritize employees' health because it affects productivity and work quality. A good organizational culture that values health should not only focus on physical well-being but also emotional and mental well-being, which are related to job tasks and the working environment. Integrating the commitment between employers and employees towards health can lead to a better work-life balance[26].

Conclusion

Working women have an increased risk of NCDs, including coronary heart disease, overweight/obesity, metabolic syndrome, and mental health problems. Besides, the double burden of job demands and domestic responsibilities increase the risk of having NCDs as compared to that of working men. However, by identifying the common risk factors, workplace interventions can be developed and health policy strengthened at workplaces to reduce the disease burden and increase work-life balance, thus valuing the significance of women's contribution towards microeconomic and macroeconomic development.

Study limitations

One of the study limitations is the selection of the 5-year interval (i.e., 2015–2019), which limited the coverage of the study. However, we decided on this interval to comprehensively understand current issues on the subject. Second, the studies were predominantly from developed Western countries. Information regarding less developed countries is limited. However, low-, middle-, and high-income countries are represented in the included studies. Further, this review only included published peer-reviewed articles and not grey literature. This may limit the comprehensiveness of the search. Lastly, only one article discussed the prevalence of cancer in working women. However, we covered the common preventable risk factors of NCD, including unhealthy diet, obesity, and lack of physical activity.

Future research may study the effect of interventions in the workplace towards reducing NCDs in working women. Moreover, exploratory studies could be conducted to understand vulnerable working populations, such as migrant workers and those working in high-risk jobs.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

This study did not require ethical approval, as it does not meet the standards of human subjects research.

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References

1) International Labour Office (ILO) (2018) World Employment and Social Outlook – Trends for Women 2018 – Global snapshot.https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_619577.pdf. Accessed on 5 April 2019.
2) Budnik LT, Adam B, Albin M, Banelli B, Baur X, Belpoggi F, Bolognesi C, Broberg K, Gustavsson P, Göen T, Fischer A, Jarosinska D, Manservisi F, O'Kennedy R, Øvrevik J, Paunovic E, Ritz B, Scheepers PTJ, Schlünssen V, Schwarzenbach H, Schwarze PE, Sheils O, Sigsgaard T, Van Damme K, Casteleyn L (2018) Diagnosis, monitoring and prevention of exposure-related non-communicable diseases in the living and working environment: DiMoPEx-project is designed to determine the impacts of environmental exposure on human health. J Occup Med Toxicol **13**:6
3) WHO (2016) WHO |NCD and Women. https://www.who.int/global-coordination-mechanism/ncd-themes/NCD-and-women/en/. Accessed on 3 Mac 2019.
4) Sojo VE, Wood RE, Genat AE (2016) Harmful Workplace Experiences and Women's Occupational Well-Being. Psychol Women Q 40:10–40
5) European Agency for Safety and Health at Work (EU-OSHA) (2014) New risks and trends in the safety and health of women at work https://osha.europa.eu/en/publications/reports/new-risks-and-trends-in-the-safety-and-health-of-women-at-work. Accessed on 4 May 2019.
6) Pluye P, Robert E, Cargo M, Bartlett G, O'Cathain A,

Griffiths F, Boardman F, Gagnon M. P, & Rousseau M.C. (2011). Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. http://www.webcitation.org/5tTRTc9yJ. Accessed on 5 April 2019

7) Low V, Gebhart B, Reich C (2015) Effects of a Worksite Program to Improve the Cardiovascular Health of Female Health Care Workers. J Cardiopulm Rehabil Prev **35**:342–7
8) D'Ovidio F, d'Errico A, Scarinzi C, Costa G (2015) Increased incidence of coronary heart disease associated with "double burden" in a cohort of Italian women. Soc Sci Med **135**:40–6
9) Dembe AE, Yao X (2016) Chronic Disease Risks from Exposure to Long-Hour Work Schedules over a 32-Year Period. J Occup Environ Med **58**:861–7
10) Mawaw PM, Yav T, Mukuku O, Lukanka O, Kazadi PM, Tambwe D, Omba J, Kakoma J-B, Bangs MJ, Luboya ON (2017) Prevalence of obesity, diabetes mellitus, hypertension and associated risk factors in a mining workforce, Democratic Republic of Congo. Pan Afr Med J **28**:282
11) Al Saweer A, Salehi S, Al Tiho M, Alekri A, Al Hawaj H, Al Zayani S (2017) Workplace health initiatives. Bahrain Med Bull **39**:216–9
12) Mentoor I, Kruger M, Nell T (2018) Metabolic syndrome and body shape predict differences in health parameters in farm working women. BMC Public Health **18**:453
13) Majeed T, Forder P, Mishra G & Byles J, 2015. Women, Work, and Illness: A Longitudinal Analysis of Workforce Participation Patterns for Women Beyond Middle Age. J Womens Health (2002) **24**(6): 455–65
14) Pedersen PV, Arnfred A, Algren MH, Juel K (2016) Comparison of health behaviors among women sex workers to those of the general population of women in Denmark. Women Health **56**:376–94
15) Cerrato J, Cifre E (2018) Gender Inequality in Household Chores and Work-Family Conflict. Front Psychol **9**:1330
16) Sara JD, Prasad M, Eleid MF, Zhang M, Widmer RJ, Lerman A (2018) Association Between Work-Related Stress and Coronary Heart Disease: A Review of Prospective Studies Through the Job Strain, Effort-Reward Balance, and Organizational Justice Models. J Am Heart Assoc **7**: 1–15
17) Lemke MK, Hege A, Perko M, Sönmez S, Apostolopoulos Y (2015) Work Patterns, Sleeping Hours and Excess Weight in commercial Drivers. Occup Med (Chic Ill) **65**:725–31
18) Hyun HS, Kim Y (2018) Associations between working environment and weight control efforts among workers with obesity in Korea. J Int Med Res **46**:2307
19) Schulte PA, Wagner GR, Ostry A, Blanciforti LA, Cutlip RG, Krajnak KM, Luster M, Munson AE, O'Callaghan JP, Parks CG, Simeonova PP, Miller DB (2007) Work, obesity, and occupational safety and health. Am J Public Health **97**:428–36
20) Hassan NE, Wahba SA, El-Masry SA, Elhamid ERA, Boseila SAW, Ahmed NH, Ibrahim TS (2015) Eating Habits and Lifestyles among a Sample of Obese Working Egyptian Women. Open Access Maced J Med Sci **3**:12–7
21) Huang PL (2009). A comprehensive definition for metabolic syndrome. Dis Model Mech 2(5–6):231–237 Company of Biologists. https://doi.org/10.1242/dmm.001180
22) Gibson R, Eriksen R, Singh D, Vergnaud A-C, Heard A, Chan Q, Elliott P, Frost G (2018) A cross-sectional investigation into the occupational and socio-demographic characteristics of British police force employees reporting a dietary pattern associated with cardiometabolic risk: findings from the Airwave Health Monitoring Study. Eur J Nutr **57**:2913–26
23) Pinkas J, Bojar I, Gujski M, Bartosińska J, Owoc A, Raczkiewicz D (2017) Serum Lipid, Vitamin D Levels, and Obesity in Perimenopausal and Postmenopausal Women in Non-Manual Employment. Med Sci Monit **23**:5018–26
24) Hall BJ, Garabiles MR & Latkin CA, 2019. Work life, relationship, and policy determinants of health and well-being among Filipino domestic Workers in China: a qualitative study. BMC public health **19**(1): 229
25) Blom M, Georgiades A, Laszlo KD, Alinaghizadeh H, Janszky I, Ahnve S (2007) Work and marital status in relation to depressive symptoms and social support among women with coronary artery disease. J Womens Health (Larchmt) **16**:1305–16
26) Taylor WC, Suminski RR, Das BM, Paxton RJ, Craig DW (2018) Organizational Culture and Implications for Workplace Interventions to Reduce Sitting Time Among Office-Based Workers: A Systematic Review. Front Public Heal. **28**: 1–14