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“Ergonomic Workplace Modifications for Pregnant Nurses: Can They Reduce Pregnancy Complications?”

RESEARCH PAPER - LITERATURE REVIEW

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ABSTRACT

The nursing workforce is dominated by women and majority of them continuously work throughout their pregnancy in physically and mentally demanding atmosphere. Complications of pregnancy such as risk of miscarriage, preterm delivery, musculoskeletal discomfort and hypertensive disorders are exacerbated due to prolonged standing, shift work, manual handling, and biological and chemical exposures. All of these risks are well-documented and yet, unfortunately pregnant nurses remain inadequately protected across numerous healthcare settings. This thesis analyzes whether ergonomic workplace modifications reduce pregnancy complications among pregnant nurses. A scoping review methodology was utilized in compliance with Arksey and O'Malley (2005) and Levac et al. (2010) s' frameworks. The research published between 1990 and 2024 was found using PubMed, Google Scholar, Web of Science and Scopus. This thesis included thirty peer-reviewed publications embedding systematic reviews, cohort studies, qualitative interviews, cross sectional analyses and institutional guidelines. Resulting data was categorized into 5 categories being ergonomic risks, biological and chemical exposures, psychosocial and organizational elements, workplace interventions and policy frameworks. The results documented show that physically demanding tasks such as heavy lifting, prolonged standing, and poor postures are strongly associated to increased rates of complications like miscarriages, premature births, and musculoskeletal disorders. Exposure to ionizing radiation, disinfectants and antineoplastic agents elevated risks of miscarriages as well and fetal growth restriction. Also, psychosocial stressors for e.g., burnout and stigma further exacerbated these outcomes. Majority of these studies highlighted that ergonomic modifications such as sit-stand workstations, footrests, mechanical lifts and shift adjustments significantly decrease absenteeism and pregnancy-related complications. Implementation, on the other hand, especially in healthcare systems that lack maternity protection laws remained inconsistent. In conclusion, pregnancy complications in nurses are highly preventable. Thus, emphasizing that ergonomic workplace modifications along with firm maternity protection laws and positive organizational cultures can dramatically decrease risks and improve both maternal and fetal outcomes.

Keywords: pregnant nurses, ergonomics, occupational exposure, pregnancy complications, workplace interventions.

KOPSAVILKUMS

Māsu darbā dominē sievietes, un lielākā daļa no viņām visu grūtniecības laiku nepārtraukti strādā fiziski un garīgi grūtā vidē. Grūtniecības komplikācijas, piemēram, spontānā aborta, priekšlaicīgu dzemdību, muskuļu un skeleta sistēmas diskomforta un hipertensijas traucējumu risks, saasina ilgstoša stāvēšana, maiņu darbs, roku darbs, kā arī bioloģisko un ķīmisko vielu iedarbība. Visi šie riski ir labi dokumentēti, tomēr diemžēl grūtnieces māsas daudzās veselības aprūpes iestādēs joprojām nav pietiekami aizsargātas. Šajā darbā tiek analizēts, vai ergonomiskas darba vietas modifikācijas mazina grūtniecības komplikācijas grūtniecēm. Tika izmantota darbības jomas pārskata metodoloģija saskaņā ar Arkseja un O'Malija (2005) un Levaka et al. (2010) ietvariem. Pētījumi, kas publicēti laikā no 1990. līdz 2024. gadam, tika atrasti, izmantojot PubMed, Google Scholar, Web of Science un Scopus. Šajā darbā tika iekļautas trīsdesmit recenzētas publikācijas, kurās iekļauti sistemātiski pārskati, kohortas pētījumi, kvalitatīvas intervijas, šķērsgriezuma analīzes un iestāžu vadlīnijas. Iegūtie dati tika iedalīti 5 kategorijās: ergonomiskie riski, bioloģiskā un ķīmiskā iedarbība, psihosociālie un organizatoriskie elementi, intervences darba vietā un politikas ietvari. Dokumentētie rezultāti liecina, ka fiziski smagi uzdevumi, piemēram, smagumu celšana, ilgstoša stāvēšana un nepareiza stāja, ir cieši saistīti ar paaugstinātu komplikāciju, piemēram, spontāno abortu, priekšlaicīgu dzemdību un muskuļu un skeleta sistēmas slimību, biežumu. Jonizējošā starojuma, dezinfekcijas līdzekļu un antineoplastisku līdzekļu iedarbība paaugstina arī spontāno abortu un augļa augšanas aiztures risku. Arī psihosociālie stresori, piemēram, izdegšana un stigma, vēl vairāk saasins stāvokli. Lielākā daļa šo pētījumu uzsvēra, ka ergonomiskas modifikācijas, piemēram, sēdus/stāvus darba vietas, kāju balsti, mehāniski pacēlāji un maiņu pielāgošana, ievērojami samazina darba kavējumus un ar grūtniecību saistītas komplikācijas. No otras puses, uzlabojumu ieviešana, īpaši veselības aprūpes sistēmās, kurās trūkst grūtniecības aizsardzības likumu, joprojām bija nekonsekventa. Noslēgumā jāsaka, ka grūtniecības komplikācijas medmāsām ir ievērojami novēršamas. Tādējādi tiek uzsvērts, ka ergonomiskas darba vietas modifikācijas kopā ar stingriem grūtniecības aizsardzības likumiem un pozitīvu organizatorisko kultūru var ievērojami samazināt riskus un uzlabot gan mātes, gan augļa veselību.

Atslēgvārdi: grūtnieces medmāsas, ergonomika, arodekspozīcija, grūtniecības komplikācijas, intervences darba vietā.

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INTRODUCTION

Background and rationale

The nursing profession is mainly dominated by women, women in their prime, reproductive age. Therefore, a large portion of the nurses worldwide are at risk for occupational exposures whilst pregnant. Since their profession is of a highly demanding nature, nurses are vulnerable to chemical exposures, biological dangers, ergonomic strain and psychosocial stresses. Globally, almost 90% of nurses are female, and a large segment of them continue working throughout their pregnancy and because of that, workplace becomes a determinant of maternal and fetal health both (WHO, 2020).

Evidence from various high-caliber studies highlights the magnitude of this issue. Lawson et al. (2012) stated in the nurses' health study ii that handling antineoplastic medications had nearly doubled the risk of miscarriage (OR 1.94), meanwhile nulliparas women are at an even higher risk (OR 3.50). Whereas in China, Jiang et al. (2023) reported exposure to disinfectants considerable increases the probability of both spontaneous abortion (OR 1.62) and threatened abortion (OR 2.29). These findings are also additionally supported by meta-analytic evidence. For e.g. Mozurkewich et al. (2000) concluded that jobs that are physically demanding increased risks of hypertensive disorders, preterm births and small-for-gestational-age infants.

These risks are not restricted to the physical domain, they are amplified when psychosocial pressures such as stigma, lack of accommodations and the cultural expectation of "supernurse" combine with physical hazards. According to Rainbow et al. (2021), it was found that nurses often do not disclose or delay informing about their pregnancy in order to avoid burdening their colleagues and coworkers even if that means putting themselves at a personal risk. Similarly, a Japanese study, Hino et al. (2024) showed nurses in Japan adopted to personalized "self-devised coping" methods when formal accommodations were not accessible. These findings highlighted that both organizational culture and workplace designs are extremely important components that determine pregnancy outcomes.

When all this research is put together, they show that pregnancy complications among nurses are influenced by modifiable occupational factors instead of being inevitable. Supportive organizational frameworks, ergonomic redesign and safe handling protocols tie together the potential to significantly improve both maternal and fetal health outcomes. The main difficulty lies in bridging the gap between real-world practice and evidence-based guidelines

to ensure that workplace safeguards are strictly and consistently applied throughout various diverse healthcare systems.

Research problem

Even though there have been decades of published recommendations and guidelines on ergonomic precautions and safe handling of hazardous materials, pregnant nurses up to this day remain disproportionately exposed to occupational risks. Although EU legislation mandates risk assessments and reassignment and Canadian frameworks offer structured paid leave, many healthcare systems such as USA and parts of Asia lack robust enforcement tools (Salihu et al., 2012).

Evidence indicates that institutional cultures usually give a greater priority on staffing needs rather than protective accommodations thereby leaving nurses vulnerable to risks which they end up self-managing instead of being formally reassigned (Vasconcelos et al., 2023). Qualitative research further demonstrates that stigma, fear of being a burden, and the tenacity of the "supernurse" identity results in continuous exposure to hazardous work (Rainbow et al., 2021, Hino et al., 2024).

This discrepancy between policy and practice poses a serious occupational health problem: pregnant nurses remain inadequately protected despite solutions existing to the well documented risks. Pregnancy complications will continue to disproportionally impact this workforce if ergonomic modifications, cultural change and institutional support are not effectively implemented.

Aims and objectives

The aim of this thesis is to examine the extent of which ergonomic workplace modification can decrease pregnancy complications among staff in the healthcare sector specifically nurses. Thereby, objectives are to

i) gather data on occupational exposures and their relation to pregnancy complications,
ii) evaluate organizational and ergonomic interventions to reduce risk and
iii) explore how cultural barriers and policy frameworks influence implementation. This thesis attempts to provide a thorough grasp of the risks pregnant nurses face as well as the opportunities for prevention through the integration of ergonomic, chemical, biological, psychosocial, and policy approaches. The ultimate goal is to highlight the recommendations that are both practically useful and academically sound and relevant to healthcare organizations looking to protect their pregnancy employees while maintaining effective and safe patient care.

Thesis structure

There are six chapters in this thesis. Chapter 1 introduces the background, rationale and aims. Chapter 2 dives into a comprehensive analysis of the literature reviews on workplace risks, interventions and policy. Chapter 3 compiles the evidence on complications. Chapter 4 discusses workplace interventions. Chapter 5 addresses organizational culture and policy frameworks. Finally, chapter 6 draws conclusions after discussing the findings and ends with highlighting the importance for practice and policy.

METHODOLOGY

This thesis utilized a scoping review design, which is well suited to map broad and complicated issues, identify key concepts, and highlight evidence gaps across different study designs (Arksey & O'Malley, 2005, Levac et al., 2010). Scoping reviews, unlike systematic reviews are suitable for combining literature on ergonomic risks, occupational exposures and policy frameworks affecting pregnant nurses because they allow integration of both qualitative and quantitative evidence (Munn et al., 2018). Between February and June 2025, a thorough search was done PubMed, Web of Science, Scopus and Google Scholar including reviews of grey literature e.g. institutional guidelines (Peters et al., 2020). Key words in searching such as pregnant nurses, ergonomics, shift work, disinfectants, antineoplastic drugs, radiation, manual handling, policy and workplace interventions were used. Peer reviewed studies that were conducted between 1990 and 2024 were included as well, these focused on ergonomic risks, pregnancy complications, occupational exposures, interventions or policy frameworks among healthcare workers or nurses. Both qualitative designs such as interviews and quantitative approaches such as cohort studies and meta-analyses were considered too (Arksey & O'Malley, 2005, Peters et al., 2020). All the relevant data were taken and organized into five main domains; ergonomic risks, chemical and biological hazards, psychosocial and organizational factors, interventions and policy frameworks (Levac et al., 2010, Munn et al., 2018). Ethical reporting techniques such as informed consent and participant anonymity and confidentiality that were included in the articles were considered, but ethics approval was not required due to this thesis being a literature review on already published research (Peters et al., 2020). The limitations of this review were mainly due to the volume of evidence available in high income countries and the disparity in study designs which restricted cross context comparisons. Nonetheless, the scoping view design led to an in-depth analysis of the literature which are available and readily accessible thus highlighting the critical topics for further research (Arksey & O'Malley, 2005, Levac et al., 2010).

LITERATURE REVIEW

3.1 Ergonomic and Biomechanical Risks

Pregnancy causes significant biomechanical changes, for e.g. ligament laxity, weight redistribution, and decreased balance, all of this heightens one's susceptibility to workplace strains. Nurses are especially affected since they have long hours with prolonged standing, and strenuous patient handling. Mozurkewich et al., (2000) demonstrated that jobs that are physically demanding increases the incidence of preterm birth (OR 1.22), hypertensive disorders (or 1.60) and small-for-gestational-age newborns (OR 1.37). Furthermore, prolonged standing for longer than 3 hours a day has been closely associated with preterm birth and musculoskeletal pain. These findings were further supported by Corchero-Falcón et al., (2023), reported that chemical exposures, night shifts and noise are linked to miscarriage, preterm delivery and low birth weight. Villar et al., (2019) showed that in Spain the healthcare professionals who withstand greater ergonomic strain had considerably higher absenteeism and more importantly, nurses had a fivefold greater risk of pregnancy-related absenteeism in contrast to non-nursing personnel. Collectively, all these results highlight a robust link between physical workload and poor pregnancy results. They emphasize on the fact that physiological changes of pregnancy make nurses particularly vulnerable in situations where occupational exposures are deemed "normal" for non-pregnant workers. This stresses the necessity for workplace modifications to decrease biomechanical risks such as lowering lifting thresholds, patient handling equipment, and frequent resting intervals.

3.2 Chemical and Biological Risks

Nurses often are exposed to hazardous agents whilst pregnant. Lawson et al., (2012) found that there are strong connections between handling antineoplastic drugs and spontaneous abortion particularly in nulliparas women. Based on Jiang et al., (2023), handling of chemotherapeutic agents doubled the risk of delivering prematurely, meanwhile disinfectants increased the risk of spontaneous and threatened abortion. Delayed miscarriages have also been linked to sterilant such as formaldehyde and ethylene oxide (Lawson et al., 2012). Another critical threat is radiation. Radiation exposure more than 0.05 Gy correlated with growth restriction, spontaneous abortions and neurodevelopmental insufficiency (Salihu et al., 2012). Nurses who work in the maternity and pediatric wards are vulnerable to biological

agents such as CMV, parvovirus and rubella which results in miscarriage or congenital abnormalities. Therefore, this body of evidence highlights the broad spectrum of risks the nurses encounter besides ergonomic strain.

3.3 Psychosocial and Cultural Risks

In a healthcare setting, the psychosocial environment plays an extremely important role in the outcomes of pregnancy. Yeh et al., (2017) stated that low autonomy and burnout doubled antenatal depression risk which has been connected to preterm birth and hypertensive disorders. In the study by Rainbow et al., (2021), the identity "supernurse" was created, where nurses postponed disclosure about their pregnancy and continued working even if it was unsafe out of stigma and guilt. These themes were also portrayed in Hino et al., (2024) in Japan, in this case, nurses were coping with their own self-devised coping mechanisms due to inaccessibility to formal accommodations. Vasconcelos et al., (2023) reported 56% absenteeism rates among pregnant hospital staff due to a mix of ergonomical, organizational and psychosocial stressors. These results emphasize the vitality of organizational culture in influencing risky and protective conducts.

3.4 Intervention Strategies

There are evidence shows that ergonomic interventions can dramatically decrease risks which will be discussed further. The research of Morrissey (1998) suggested workplace rules which included limiting lifting to ≤15kg, avoid prolonged standing and keeping noise levels under 85 dba. Self-care guidelines were implemented by Anderson and Johnson (2004) built around micro breaks, workstation design and seated posture. These guidelines were modified by Francis et al., (2021) recommending lifting ≤ 23kg until 24 gestation weeks, and thereafter ≤11kg, also the use of sit stand desks and mechanical patient lifts. These measures are implemented via institutional frameworks such as UBC Ergonomics (2021). Chhabra et al., (2023) broadened the vision by linking ergonomics to Sustainable Development Goals (SDGs), stressing equity and inclusion. Collectively, these frameworks highlight that ergonomic redesign in combination with organizational support, yields tangible improvements in safety.

3.5 Policy and Organizational Culture

Policy frameworks significantly influence the extent of workplace protections. Salihu et al., (2012) researched cross-country differences with the US stressing anti-discrimination but lacks mandated reassignment, Canada offers paid leave, and the EU and require formal risk assessment with reassignment if needed. According to Vasconcelos et al., (2023), hospitals often rely on sick leave instead of practicing reassignment, decreasing protective benefits. In addition, Villar et al., (2019) demonstrated that absence rates dramatically fell once Spain's "*Protección De Riesgo Durante El Embarazo"* (PRE) implemented structure reassignment. Cultural barriers were recognized when nurses reported guilt and fear of burdening their coworkers. This cultural barrier undermines the policy protections, emphasizing that organizational culture and legislative frameworks both must be in concordance.

3.6 Summary

In summary, these literatures highlights that there is a consistent link between ergonomic, biological, chemical and psychosocial factors and adverse pregnancy outcomes. Policy protections and interventions do exist however they are disproportionately enforced across various countries and institutions. Up to date, enforcement gaps and cultural stigma continue to be critical challenges. Concluding that this thesis argues that both cultural change and physical redesign are essential for effective solutions, situating ergonomic workplace modifications within this broader evidence spectrum.

RESULTS (COMPLICATIONS)

4.1 Overview of Included Studies

This thesis includes 30 published articles between 1990 and 2024. The study designs in this thesis comprised of systematic reviews, cross-sectional surveys, retrospective and prospective cohort studies, meta-analyses, institutional guidelines and qualitative interviews. Despite current contributions are from Japan, Brazil, Oman and Japan (Jiang et al., 2012, Vasconcelos et al., 2023, Francis et al., 2021, Hino et al., 2024), most of them originated from the high-income countries like USA, Canada and EU (Lawson et al., 2012, Mozurkewich et al., 2000, Villar et al., 2019).

4.2 Ergonomic and Biomechanical Risks

The evidence show that physical workload is consistently linked to pregnancy complications. Standing for longer than 3 hours a day was shown to increase the risk of hypertensive disorders and preterm births (Mozurkewich et al., 2000, Corchero-Falcón et al., 2023). Also, heavy lifting and manual handling correlate with musculoskeletal pain, miscarriages, premature births, with ergonomic thresholds established at ≤10-15 kg (Morrissey, 1998, Francis et al., 2021). In addition, the figure below shows the prevalence of musculoskeletal complaints that repetitive bending and awkward postures caused (Paul et al., 1994), these actions also resulted in higher rates of absenteeism (Vasconcelos et al., 2023).

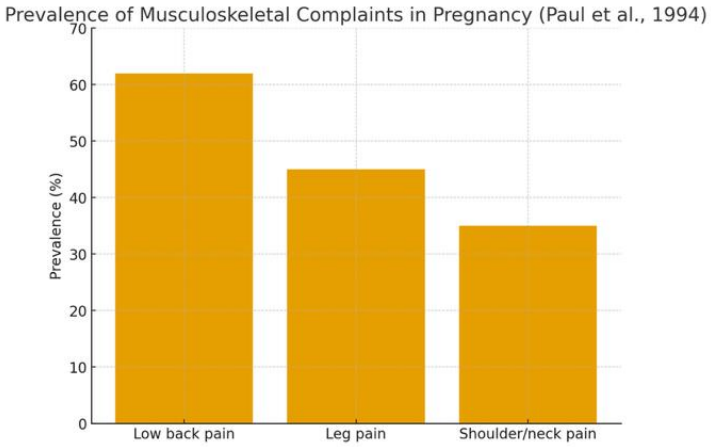

Figure 4.1. Prevalence of musculoskeletal complaints among pregnant women, illustrating that low back pain is the most frequently reported symptom, followed by leg and shoulder/neck pain. Data from Paul et al. (1994).

4.3 Chemical and Biological Risks

Chemical and biological exposure is very common with pregnant nurses. Handling antineoplastic drugs and chemotherapy agents is linked with preterm births and nearly doubled the risk of pregnancies resulting in miscarriages. In addition, formaldehyde, sterilant and disinfectant exposure elevated the risks of spontaneous and threatened abortions (Lawson et al., 2012, Jiang et al., 2023). Exposure to radiation exceedingly over 0.05 Gy is associated with spontaneous abortion and growth restriction (Salihu et al., 2012). The last biological risk being exposed to viruses as a healthcare staff. Obstetric and pediatric nurses are more prone to risks of CMV, parvovirus, and rubella infections, all of which are responsible for miscarriages and congenital abnormalities (Salihu et al., 2012).

4.4 Psychosocial and Organizational Risks

Yeh et al., (2017) stated that burnout and low autonomy doubled the risk of prenatal depression which is connected to hypertensive disorders and premature birth. Nurses are constantly pressurized due to workplace culture which makes them want to uphold a "supernurse" identity as was reported by Rainbow et al., 2021 thus, delaying disclosure and continuing unsafe practices. In Japan, Hino et al., 2024 reported that nurses use self-made coping mechanisms since there was a lack of institutional accommodation, reflecting their cultural values and norms. And in some cohorts, absenteeism exceeded over 50% due to psychosocial stress, lack of accommodation and ergonomic strain (Vasconcelos et al., 2023).

4.5 Interventions and Ergonomic Modifications

Ergonomic redesigning has been shown to decrease musculoskeletal strain and fatigue with implementation of realistic modifications for instance reclined seating, mechanical lifts, sit-stand workstations, and anti-slip flooring (Morrissey, 1998, Anderson & Johnson, 2004, Francis et al., 2021).

Figure 4.2. Ergonomic workstation setup for a pregnant nurse, including reclined seating, desk height adjustment, and footrest. Adapted from Anderson & Johnson (2004).

Figure 4.3. Correct use of a mechanical patient lift as an alternative to manual handling. Adapted from Francis et al. (2021).

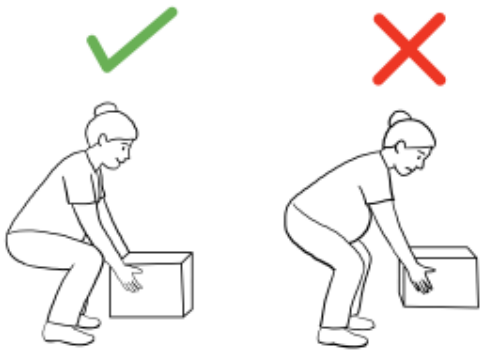

Figure 4.4. Correct versus incorrect lifting techniques for pregnant nurses. Adapted from UBC Ergonomics (2021).

Figure 4.5. Sit–stand workstation solution to reduce fatigue and musculoskeletal strain. Adapted from Francis et al. (2021).

Workplace modifications involve sit-stand working stations, use of footrests, limits in lifting (≤10-15kg/ ≤23kg until 24 weeks and thereafter ≤11kg) and avoiding overhead reaching. Furthermore, shift modifications such as limiting working hours to ≤40 hours a week and avoidance of night shifts also decrease risks. In addition, environmental controls that are also effective can be achieved by lowering noise levels to <85 dba, vibrations ≤2 hours per day and anti-slip flooring. One of the most critical protective measures is reassigning pregnant staff from high-risk biological and chemical exposures like chemotherapeutic agents, wards that are CMV-prone and sterilant. Collectively, all the included ergonomic recommendations highlight the benefits and advantages of merging employer driven design frameworks and with worker education (Morrissey, 1998, Anderson & Johnson, 2004, Francis et al., 2021, UBC Ergonomics, 2021).

Workplace policies such as structured reassignment programs ensure that pregnant nurses have no obligation to perform hazardous tasks thus consistently reducing complications and absenteeism (Villar et al., 2019, Vasconcelos et al., 2023).

Lastly, even psychosocial interventions e.g. granting counselling services, enhancing job control and implementing disclosure procedures and peer mentorship networks foster supportive atmosphere, lower stigma, stress and sick leaves (Rainbow et al., 2021).

4.6 Policy and Cultural Dimensions

Discrepancies are seen worldwide, for instance, the EU and UK demand risk assessments and reassignments, Canada has paid leave available whereas the UK solely relies on anti-discrimination laws (Salihu et al., 2012). Another takeaway observed is gaps in

implementation. Healthcare institutions often limit protection by just replacing sick leave for reassignment (Vasconcelos et al., 2023). Despite there being protective laws, nurses are frequently discouraged from disclosing their pregnancies early due to guilt and stigma (Rainbow et al., 2021, Hino et al., 2024).Low- and middle-income countries (LMICs) studies from China and Oman highlight the clear protection gaps with nurses taking on high risk activities without accommodations (Jiang et al., 2023, Francis et al., 2021).

4.7 Summary of Results

To summarize, there are strong correlations with complications among pregnant nurses and workplace exposures. Ergonomic demands such as lifting, standing and night shifts elevate the likelihood risks of hypertensive disorders, miscarriages and preterm delivery. Also mentioned earlier, chemicals and biological threats involving sterilant, radiation, chemotherapy drugs, disinfectants and CMV further worsen the risk profile with congenital anomalies, growth restriction and miscarriages as well. Additionally, psychosocial pressures and organizational culture exacerbate threats often resulting in increased absenteeism and stress-related outcomes such as prenatal depression and unsafe practices. Finally, ergonomic interventions and policy enforcement drastically decrease risks however unfortunately they are inconsistently implemented through various countries and institutions.

Therefore, workplace interventions highlight that detrimental outcomes are not only preventable but also manageable via very simple modifications. Ergonomic modifications like sit-stand stations patient lifts and posture guidelines lower physical strain, meanwhile, being reassigned from dangerous chemicals and infectious environment decreases biological and chemical threats. Psychosocial policies and interventions such as peer support, supervisor training and disclosure pathways normalize accommodations and lessen stigma. By fusing employer driven designs with worker directed techniques, hospitals can protect pregnant nurses while maintaining effective and safe patient care. Considering holistically, the evidence confirms that pregnancy complications in nurses are not inevitable but instead are influenced by workplace factors which are easily modifiable, thus emphasizing the urgency for effective preventative measures and interventions.

POLICY AND ORGANIZATIONAL CULTURE

5.1 Introduction

Even though ergonomic and workplace risks are extensively researched, the level to which pregnant nurses are protected vastly depends on policies and organizational cultures in place. Whether evidence-based accommodations are ignored or enforced are determined only when laws, institutional policies and cultural expectations work together. This chapter covers international policy frameworks, hospital-level procedures and cultural factors that determine the management of pregnancy in the nursing department.

5.2 Legislative and Regulatory Frameworks

Cross-national comparisons reveal significant discrepancies in protective measures available to expectant nurses. Firstly, in the EU and UK, employers are legally required to conduct risk assessments for pregnant employees and if risks are present, then the women must be reassigned to safer duties and/or offered leave. This framework ensures a high degree of formal protection however enforcement differs by institutions (Salihu et al., 2012). Next, in Canada there are laws that even offer compensated reassignment programs which allow pregnant staff to be momentarily reassigned to safer tasks without incurring financial burdens thus decreasing both complications and absenteeism (Villar et al., 2019). Unfortunately, in the US many nurses have exposure to hazardous tasks and mainly because the pregnancy discrimination act only restricts dismissal but does not mandate reassignment. So legal protections do exist, but structural accommodations are marginal. Furthermore, evidence for LMICs is limited but steadily growing. In China and Oman, Jiang et al., (2023) and Francis et al., (2021) drew attention to consistent gaps in the workplace protections because of rare risk assessments and expecting nurses self-managing risks most of the time.

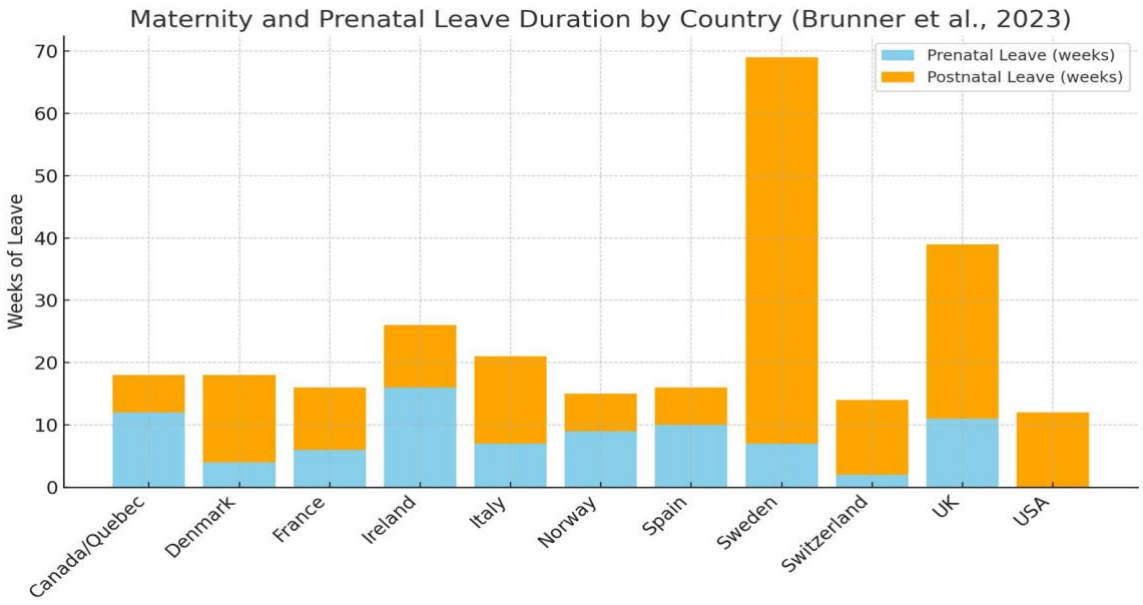

Figure 5.1. Duration of maternity and prenatal leave by country, illustrating international variation in legislative protections for pregnant workers. Data from Brunner et al. (2023).

The above bar chart highlights the wide variance in international policy frameworks on prenatal and maternity leave, it ranges from no paid leave in the US to shared parental leave exceeding over a year in Sweden (Brunner et al., 2023). Laws that offer generous leave allow women to take time off from work thus offering substantial protection against occupational threats, however they still don't replace the necessity for workplace ergonomic modifications. Way before leave is offered, early on in pregnancy, nurses particularly face unavoidable exposures to prolonged standing, long shifts ad heavy lifting and therefore in strict systems such as Switzerland and the US, the lack of prenatal leave means that nurses continue working in unsafe environments increasing the complication risks such as miscarriages, premature birth and musculoskeletal pain. In contrast, in countries with more robust leave protections like in Sweden and Canada, leaving work decreases the exposures later in the pregnancy however this advantage is limited because majority of the complications take place during the first two trimesters. Nevertheless, evidence shows that musculoskeletal problems, psychosocial stresses and night work are the main causes of absenteeism during pregnancy even in countries with strong leave policies thus signifying the importance of proactive ergonomic modifications. If necessary, maternity protection is combined with systematic workplace interventions for e.g. supportive organizational cultures, flexible scheduling and lifting aids, healthcare systems will be able to protect their maternal health better, decrease pregnancy complications and minimize workforce disturbances.

5.3 Hospital Level Policies and Practices

In an institutional level, hospitals implement protections differently such as i. Reassignment programs – in practice, reassignment programs lower absence rates and complication (Vasconcelos et al., 2023). That said, reassignment is often replaced with sick leave, shifting the burden to the employee from the employer, ii. Ergonomic guidelines – institutions such as UBC Ergonomic (2021) offer thorough checklists e.g. restricting lifting limits to ≤25 lbs. And avoiding overhead tasks but unfortunately adoptions vary, iii. Supervisor discretion – in reality, accommodations usually depend on direct supervisors' attitudes rather than on institutional policies, resulting in inadequate protection.

5.4 Organizational Culture and Stigma

If organizational culture discourages disclosure or accommodation, policies are scant. For instance, the "supernurse" identity discovered in Rainbow et al., (2021), highlighting that many nurses continue performing unsafe duties far into pregnancy and delay disclosing their pregnancies out of fear and guilt of burdening their colleagues. Another study, Hino et al., (2024), reported guilt and coping strategies in Japanese nurses, frequently ignoring their own needs to prevent workflow interruption and instead rely on self-devised coping methods. Most importantly, Rainbow et al., (2021), emphasized that support and normalization from supervisors and peers made nurses more comfortable to disclose pregnancies early and accept adjustments, improving outcomes.

5.5 Case Examples

- Spain: the PRE program offer paid benefits and reassignment for pregnant staff and Villar et al., (2019) showed this lessened absenteeism and improved pregnancy results among healthcare staff.
- Brazil: regardless of legal frameworks, (Vasconcelos et al., 2023) noted elevated absenteeism, reflecting a cultural belief on sick leave rather than proactive workplace modification.
- Japan: Hino et al., (2024), stated that even though legal frameworks are available, cultural barriers and self-sacrifice characteristics compromise actual protections.

5.6 Chapter Conclusion

Policy frameworks and organizational culture are critical components in determining whether pregnant nurses obtain strong protection. Robust legal frameworks like in the EU, UK and Canada offer a groundwork for safe accommodations. Nonetheless, implementation gaps, poor enforcement and deep-rooted cultural barriers strain its effectiveness. Therefore, policies must work parallelly with cultural change to form workplaces where employers encourage disclosure, accommodations become routine and pregnancy is acknowledged as a serious occupational health concern.

DISCUSSIONS

6.1 Integration of Findings

This thesis explored whether ergonomic workplace modifications reduce pregnancy complications among nurses. All the evidence confirmed that ergonomic, biological, chemical and psychosocial risks are highly connected to detrimental maternal and fetal outcomes. These data comply with meta-analyses emphasizing that physically demanding tasks like heavy lifting and prolonged standing indicate an elevated risk of preterm delivery, miscarriages and hypertensive disorders (Mozurkewich et al., 2000, Corchero-Falcón et al., 2023). Additionally, risks of miscarriage and preterm delivery were significantly elevated when exposed to antineoplastic drugs and disinfectants (Lawson et al., 2012, Jiang et al., 2023). Beyond that, the review also underscored the effect of organizational culture and psychosocial stressors. Stigma affiliated with the “supernurse” identity, low autonomy and burnout were connected to prenatal depression and risk exposed work practices (Yeh et al., 2017, Rainbow et al., 2021). Hino et al., (2024) also stated that cultural expectations led to Japanese nurses often depended on self-coping mechanisms, emphasizing the relationship between individual health and workplace culture.

6.2 Implications for Practice

Based on the evidence, ergonomic modifications help prevent pregnancy complications in nurses through mechanical patient lifts, safe lifting thresholds, noise and vibration controls and sit-stand workstations (Morrissey, 1998, Francis et al., 2021). Also, protective reassignment policies decrease adverse outcomes when workers are removed from hazardous

jobs such as exposure to radiation and handling chemotherapy (Villar et al., 2019, Vasconcelos et al., 2023). And psychosocial interventions such as disclosure programs, supervisor training and peer mentorship help normalize accommodations and lower stigma (Rainbow et al., 2021). As a result, if hospitals implement these measures not only protect maternal and fetal health but also increase workforce retentions and lower absenteeism.

6.3 Policy Implications

Policy frameworks were researched to be determinants of safety and equity. As mentioned earlier, UK and EU mandate risk assessments and reassignments while Canada offers structured paid benefits, whereas the US offers weaker protections as they mainly rely on anti-discrimination laws (Salihu et al., 2012). Pregnant nurses continue to be vulnerable in LMICs like China and Oman because enforcement remain inconsistent (Jiang et al., 2023, Francis et al., 2021). However cultural barriers frequently impede the efficacy of legal frameworks even in high-income countries (Vasconcelos et al., 2023). All of this indicates that cultural change at the organizational level should be combined with legislation.

6.4 Contributions to Literature

This thesis adds to the literature by synthesizing data from ergonomic, biological, chemical, psychosocial and policy dimensions, emphasizing cultural and organizational context of pregnancy accommodations such as delayed disclosure and stigma (Rainbow et al., 2021, Hino et al., 2024), also identifying gaps in evidence in LMICs, where pregnant nurses continue to be under protected even though occupational risks are globally recognized (Jiang et al., 2023, Francis et al., 2021).

6.5 Limitations and Future Research

The publication’s limitations included depending on research mainly from high-income countries, variations in study design, and the lack of inclusion of data from LMICs. Direct comparisons were often challenging because of methodological discrepancies. To alleviate global inequities, future research should include additional evidence from LMICs, evaluate long-term results of ergonomic interventions and use qualitative methods to investigate psychosocial and cultural barriers (Hino et al., 2024).

CONCLUSION

Pregnant nurses are constantly at risk for occupational exposures which amplify the risks of miscarriages, premature births, musculoskeletal disorders and psychosocial pressures. Although, these risks are modifiable. Pregnancy complications dramatically decrease complications through ergonomic modifications, proactive reassignment and positive organizational cultures. Legal frameworks ensure a strong base for protection, but for real-world impact, cultural change and enforcement are critical.

Finally, this thesis concludes that ergonomic workplace modifications anchored within strong policy frameworks while encouraging positive workplace cultures, can substantially reduce pregnancy complications among nurses (Francis et al., 2021, Vasconcelos et al., 2023).

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Declaration

I, Aysha Basheer, certify that this research paper on the topic

"Ergonomiskas darba vietas izmaiņas grūtniecēm tādējādi samazinot grūtniecības komplikācijas"

(Title of the Research Paper in Latvian)

"Ergonomic workplace modifications for pregnant nurses: can they reduce pregnancy complications?"

(Title of the Research Paper in English)

is my own independent research. All other sources of data, definitions and quotations in my Research Paper are referenced accordingly. The text of this Research Paper has never been submitted in any way to any other National Examination Commission for evaluation in its entirety or parts, and has never been published in its entirety.

/ Aysha Basheer /

(Student's signature) (Name, Surname)

16th October 2025.