

## RESEARCH REPORTS

# Systematic Review: Vitamin D Deficiency in Women and Correlation with Lifestyle for Women: A Focus on Asian Women

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**ABSTRACT** *Inadequate vitamin D levels are a worldwide health problem that threatens not just bone health but also other aspects of human wellness. Because Asian women are a distinct demographic shaped by culture, location, and personal decisions, this systematic review explores the nuanced connection between lifestyle variables and vitamin D insufficiency in this population. The study's primary aim is to answer three research questions about deficiencies: (1) the lifestyle factors that contribute to them, (2) the effects on health as a whole, and (3) the most effective interventions and remedies. Keywords: COVID-19 crisis, public opinion, Maldives, preferences, values*

*The results show that vitamin D insufficiency in Asian women is highly influenced by clothing choices, occupational limits, and regional differences in sun exposure. The deficiency, in turn, is shown in the literature, to be associated with diverse health consequences, including infertility, metabolic syndrome, and pregnancy-related complications.*

*To mitigate deficiency, culturally sensitive interventions are essential. Optimizing safe sun exposure, dietary modifications, supplementation, education, and specialized prenatal care offer promising strategies. Healthcare providers and policymakers must collaborate to develop comprehensive, culturally tailored approaches to address vitamin D deficiency among Asian women, ultimately enhancing their health and quality of life. This systematic review contributes critical insights into a multifaceted health issue and emphasizes the importance of personalized interventions within this specific demographic.*

*Key Words: Vitamin D Deficiency, Lifestyle,*

## Introduction

### Background Information

Recognition of vitamin D's influence on well-being has increased due to its importance in bone health. Recent studies have shown its effects on several health factors beyond its classic role in ensuring bone density and calcium homeostasis. Effects on autoimmune disorders, cancer danger, metabolic syndrome, infection resistance, cardiovascular wellness, and pregnancy-related diabetes are all within

this scope. Due to its wide-ranging effects, vitamin D is now widely recognized as an essential nutrient (Amrein et al., 2020). The production of vitamin D by exposure to sunshine is central to this account. Vitamin D<sub>3</sub>, the active form, is produced predominantly in the skin in response to exposure to ultraviolet B (UVB) light. Sunlight is the major source of vitamin D, and the length and intensity of sun exposure directly affect the amount of vitamin D in the body (Płodowski et al., 2023). Considering the health consequences of vitamin D insufficiency, this systematic review investigates the link between several lifestyle factors and low vitamin D levels among Asian women..

Because of differences in culture, geography, and lifestyle, Asian women are a unique group of people. Despite residing in sunny climates, they are at risk for vitamin D insufficiency due to culturally distinctive practices that limit exposure to sunshine. Cultural and religious norms encourage covered forms of attire that reduce exposure to direct sunlight. Moreover, many Asian women work inside since their jobs need them to, limiting their time in the sun even more. Understanding vitamin D dynamics in this group is complicated by the interaction of culture, tradition, and occupation. Even while vitamin D may be obtained via food and supplements, traditional dietary patterns among Asian women may cause them to consume too little of the nutrients. Taking into account cultural and geographical settings, this study tries to deconstruct and examine the complex relationships between lifestyle variables and vitamin D insufficiency in Asian women. It aims to inform personalized public health actions for this specific group by illuminating the dynamics at play in this context.

### **Research Questions**

This review embarks on a journey to address two fundamental research questions:

1. What are the lifestyle factors that contribute to vitamin D deficiency in Asian women?
2. What is the impact of vitamin D deficiency on the overall health and well-being of Asian women?
3. What are the most effective remedies and interventions to address and mitigate vitamin D deficiency among Asian women, considering the root causes and health implications of deficiency in this population?"

These research questions serve as guideposts, directing our exploration into the intricate interplay of lifestyle choices, cultural practices, geographical influences, and their cumulative impact on vitamin D levels within this specific demographic.

### **Objectives of the Review:**

The overarching objective of this systematic review is to meticulously investigate the nexus between lifestyle factors and vitamin D deficiency in Asian women. Additional objectives include;

1. To determine what causes vitamin D insufficiency in Asian women by analyzing a wide range of lifestyle variables.

2. To investigate in depth the effects of vitamin D insufficiency on the physical and mental health of Asian women.
3. To Provide information on possible remedies and approaches to reduce vitamin D insufficiency among Asian women

With these goals in mind, this systematic review sets out to shed light on the complex relationships between Asian women's lifestyle choices and vitamin D insufficiency. Further, it seeks to provide useful information that may direct public health programs targeted at this population.

### **Search Strategy:**

A thorough search technique was used to obtain relevant papers from several databases for inclusion in this systematic review. The researchers relied mostly on databases such as PubMed, MEDLINE, Embase, and Google Scholar. The search terms included those pertaining to vitamin D insufficiency, lifestyle variables, and Asian women. The search strings included terms such as "vitamin D deficiency," "lifestyle factors," "Asian women," and variations thereof. Boolean operators (AND, OR) were used to refine the search and identify studies that specifically addressed the correlation between lifestyle and vitamin D deficiency in Asian women. The search was limited to studies published in English and conducted within the last decade to ensure relevance. The search approach was carried out autonomously by two researchers, with any inconsistencies being addressed via deliberation.

### **Inclusion Criteria:**

To ensure the quality and relevance of the studies included in this systematic review, researchers established clear inclusion criteria:

- Study Population: Studies that focused exclusively on women. We considered women of all age groups within the Asian demographic.
- Study Type: Only peer-reviewed primary research articles were included. Reviews, meta-analyses, and commentaries were excluded.
- Outcome of Interest: Studies that examined the association between lifestyle factors (such as sun exposure, clothing choices, dietary practices, and occupation) and vitamin D deficiency in Asian women were considered.
- Publication Date: Studies published within the last decade (from 2013 to 2023) were included to ensure the most current evidence.

### **Exclusion Criteria:**

Researchers applied strict exclusion criteria to maintain the quality and relevance of the studies included in our systematic review:

- Studies not focusing on women: Studies that did not exclusively investigate vitamin D deficiency in women were excluded.
- Non-peer-reviewed studies: Non-peer-reviewed articles, conference abstracts, and gray literature were excluded to ensure the reliability of the included studies.

- Language: Due to linguistic barriers, studies published in languages other than English were not included.

### Study Selection Process:

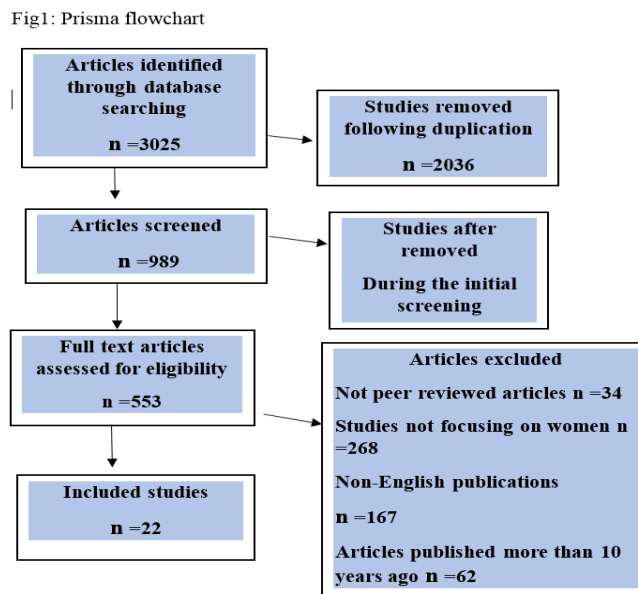
The study selection process was conducted in multiple stages to ensure the thorough and systematic inclusion of relevant articles:

- Initial Screening: Articles were screened first by reading their titles and abstracts to see whether they were possibly relevant. Articles were not considered further if they did not fulfil the inclusion requirements.
- Fulltext Assessment: After the initial screening, the full texts of the remaining articles were assessed in detail to determine their eligibility based on the inclusion and exclusion criteria.

### PRISMA Flowchart

The PRISMA flowchart illustrates the transparent and methodical study selection procedure that will be utilized to guarantee that studies are selected according to predefined criteria.

Fig1: Prisma flowchart



## **Results**

This section presents the results of the systematic review, addressing the research questions concerning the lifestyle factors contributing to vitamin D deficiency in Asian women, the impact of such deficiency on their overall health and well-being, and the most effective remedies and interventions to mitigate this deficiency within this specific population.

### **Lifestyle Factors That Contribute to Vitamin D Deficiency in Women**

The association between lifestyle factors and vitamin D deficiency in Asian women is multifaceted and influenced by cultural, geographical, and individual behaviours. From this review it is evident that several studies have provided valuable insights into these lifestyle factors. They can be summarised as:

- Sun exposure and clothing choices: The level of sun exposure and clothing choices significantly impact vitamin D status among Asian women. Studies by Abu-Samak et al. (2019) in Jordanian men and women and AlQuaiz et al. (2018) found that limited sun exposure due to cultural clothing choices and occupation-related factors contributes to vitamin D deficiency. Kift et al. (2013) provide more support to this observation by noting that South Asians in the UK had lower vitamin D levels than whites do, owing to limited cutaneous sun exposure.
- Dietary practices: The consumption of vitamin D may be altered by dietary choices that are shaped by cultural factors. The study conducted by Akhtar et al. (2019) revealed the presence of vitamin D insufficiency among female university students in Pakistan, hence shedding light on probable deficiencies in their food intake. A study conducted by Santana et al. (2022) focusing on Brazilian women also highlighted the potential health effects of dietary patterns and amounts of sun exposure on the status of vitamin D.
- Geographical variations: Vitamin D insufficiency is also affected by geographical variables like latitude. The effects of geography on vitamin D sufficiency were shown by studies of Chinese and Japanese populations by Chen et al. (2017) and Nakamura et al. (2015), respectively. Vitamin D insufficiency is discussed by Nimitphong and Holick (2013) in Southeast Asia, with an emphasis on the importance of sun exposure in more tropical places.

### **The Effects of Vitamin D Insufficiency on Women's Health and Well-Being.**

Study results on vitamin D deficiency's impact on the health and well-being of Asian women.

- Health conditions: Vitamin D insufficiency was observed to enhance the incidence of tubal factor infertility in Chinese women by Chen et al. (2018).

Huang et al. (2019) also explored the combined impact of vitamin D and estradiol deficiency on metabolic syndrome in Chinese postmenopausal women, identifying potential risks to health.

- **Pregnancy and gestational health:** Multiple research, including those by Judistiani et al. (2019), Xiao et al. (2015), and Zhao et al. (2017), have emphasized the risks of vitamin D insufficiency during pregnancy for Asian women. These studies highlight the possible effects of maternal vitamin D levels on pregnancy outcomes and the risk of disorders like preeclampsia.
- **Metabolic and bone health:** Among Asian women, the correlation between vitamin D status and metabolic variables such as insulin resistance and serum uric acid levels has been studied by Man et al. (2017), Peng et al. (2013), Xie et al. (2019), and Zhang et al., (2016). According to the results, there may be a link between vitamin D insufficiency and metabolic health.

### **Most Effective Remedies and Interventions to Address and Mitigate Vitamin D Deficiency Considering the Root Causes and Health Implications of Deficiency in This Population**

The results of studies examining the impact of vitamin D deficiency on the health and wellbeing of women.:

- **Sun exposure strategies:** The need to optimize ultraviolet B (UVB) radiation exposure for pregnant women in tropical zones is emphasized by Judistiani et al. (2019). Deficiency may be alleviated by the use of strategies that promote safe sun exposure at designated times.
- **Dietary modifications:** Increasing vitamin D consumption by dietary interventions may be useful, particularly in cultures that place dietary limitations. Santana et al. (2022) address the effects of food on vitamin D levels in Brazilian women, providing useful information for making dietary changes
- **Supplementation:** When enough vitamin D intake from food and sun exposure is not achieved, supplementation may be beneficial. Supplement choices should be made after careful consideration of individual needs as well as expert opinion (Shirazi et al., 2013).

By considering these findings, healthcare professionals can tailor interventions to address vitamin D deficiency in Asian women, taking into account cultural, geographical, and individual factors that influence their vitamin D status.

## **Discussion**

Vitamin D insufficiency has far-reaching effects on people's health all around the world. While traditionally recognized for its role in maintaining bone health and calcium balance, vitamin D has emerged as a versatile player in overall health. The purpose for this systematic review was to better understand the causes, consequences, and possible treatments for vitamin D insufficiency in Asian women by examining the relationship between lifestyle variables and this condition. The three main research topics serve as the discussion's framework:

## **Lifestyle Factors That Contribute to Vitamin D Deficiency in Asian Women**

To a large extent, vitamin D insufficiency among Asian women may be attributed to the ways in which they choose to cover their skin. Cultural and religious norms that emphasize covering up often result in people exposing far less skin to the sun. Cultural dress traditions were linked to less sun exposure in studies of Jordanian men and women by Abu-Samak et al. (2019) and AlQuaiz et al. (2018). Kift et al. (2013) point out that South Asian women in the UK also have lower vitamin D levels than white people do because they spend less time in the sun's rays. In light of these results, it is clear that cultural norms have a substantial effect on vitamin D levels among Asian women.

Sunlight avoidance may also be influenced by a variety of occupational circumstances. Working inside, as is usual for many Asian women, significantly reduces their exposure to the sun. The research of AlQuaiz et al. (2018), which highlights the significance of occupational variables in leading to vitamin D insufficiency, lends credence to this idea. Factors such as latitude also affect vitamin D levels, so it's important to consider where you live. Vitamin D sufficiency in China and Japan have been shown to vary greatly depending on geography, as shown by studies by Chen et al. (2017) and Nakamura et al. (2015). Vitamin D insufficiency is discussed by Nimitphong and Holick (2013) in Southeast Asia. They point out the need for sun exposure in these latitudes.

## **The Impact of Vitamin D Deficiency on The Overall Health and Well-Being of Asian Women**

The effects of vitamin D insufficiency on the health and wellbeing of Asian women are far-reaching, according to research (Palacios & Gonzalez, 2014). Several diseases and disorders, such as infertility and metabolic syndrome, have been linked to this deficit. Vitamin D insufficiency was observed to enhance the incidence of tubal factor infertility in Chinese women by Chen et al. (2018) and Tan et al., (2013). This underlines vitamin D's possible involvement in reproductive health, which is especially important for women of Asian descent. Vitamin D and estradiol deprivation have been shown to have additive effects on metabolic syndrome in Chinese postmenopausal women, a topic that Huang et al. (2019) investigated. Their research showed that vitamin D insufficiency might pose health hazards, such as metabolic problems. The significance of these results for the maintenance of metabolic health in Asian women highlights the need to maintain appropriate amounts of vitamin D.

Several studies have shown that pregnant Asian women are more at risk for vitamin D insufficiency. Several recent studies, including those by Judistiani et al. (2019), Xiao et al. (2015), Darling et al. (2013), and Zhao et al. (2017), have highlighted the possible effects of vitamin D levels in pregnant mothers on birth outcomes and the development of complications like preeclampsia. Taking care of vitamin D insufficiency during pregnancy is crucial for the health of the mother and the child. Inadequate vitamin D levels have also been related to metabolic and bone health problems, particularly in women of Asian descent. Vitamin D

status is linked to insulin resistance, serum uric acid levels, and bone metabolism, as studied by Man et al. (2017), Peng et al. (2013), and Xie et al. (2019). These results imply that vitamin D insufficiency may lead to metabolic abnormalities and osteoporosis, underscoring the wider health consequences of low vitamin D levels.

### **The Impact of Vitamin D Deficiency on The Overall Health and Well-Being of Asian Women**

A multimodal strategy that considers cultural, regional, and individual aspects is needed to combat vitamin D insufficiency among Asian women. Some examples of helpful remedies and interventions are:

- Sun exposure strategies: Vitamin D insufficiency may be prevented or treated by increasing exposure to ultraviolet B (UVB) radiation, particularly during certain hours of the day. Safe sun exposure during pregnancy is emphasized by Judistiani et al. (2019). This method may be used in other areas that get enough sunlight to promote healthy vitamin D levels.
- Dietary modifications: Increasing vitamin D consumption by dietary interventions may be useful, particularly for those living in cultures that place dietary limitations. Santana et al. (2022) explore the effects of food on vitamin D levels in Brazilian women, providing useful information on how to increase vitamin D consumption via dietary changes.
- Supplementation: Supplemental vitamin D may be required if efforts to improve vitamin D levels via food and sun exposure are inadequate (Płodowski et al., 2023). Whether or not to take a supplement is a choice that should be informed by both personal preference and expert opinion.
- Education and awareness: Education regarding vitamin D and its sources, as well as culturally appropriate information about the risks of vitamin D deficiency, may motivate Asian women to take charge of their health (Zhen et al., 2015).
- Pregnancy care: Treatment of vitamin D deficiency as early as possible during pregnancy by testing, supplementation, and monitoring is critical for ensuring optimal health for both mother and child (Pudowski et al., 2023).

While many factors contribute to Asian women's vitamin D deficiency, this review focuses on the complex interplay of lifestyle factors, cultural traditions, geographical differences, and individual actions. Implications for reproductive, metabolic, and skeletal health are just a few of the many areas negatively affected by this deficiency. In order to successfully tackle this complex problem, it is essential to implement customized treatments that take into account the distinct features of Asian women and their individual requirements.



## **Conclusion**

Finally, this systematic review has shed light on the causes, consequences, and possible treatments for vitamin D insufficiency in Asian women by analyzing the complex link between lifestyle variables and vitamin D deficiency in this population. Previously appreciated for maintaining strong bones and normal calcium levels, vitamin D now plays a broader function in health maintenance. The primary aim of this literature review was to determine the contributing factors to low vitamin D levels in Asian women. Major contributors to this deficiency include cultural constraints of dress, job restrictions, and geographical variances in sun exposure. Women in Asia are encouraged by cultural and religious standards to cover up, protecting more of their skin from the sun. In addition, many Asian women have office jobs, which restricts their time spent outside.

The second topic this study sought to answer concerned the impact that vitamin D deficiency has on the physical and mental health of Asian women. Vitamin D deficiency has been related to many health conditions, including sterility, metabolic syndrome, and complications during pregnancy. These results highlight the significance of treating vitamin D insufficiency in ensuring the health of Asian women, especially during vulnerable times of life like pregnancy and menopause. The third line of inquiry probed the feasibility of several treatments and interventions for vitamin D insufficiency. Optimal safe solar exposure, dietary changes, supplements, education and awareness, and specialized prenatal care were all used as methods. These programs must take into account the unique cultural context of Asian women and be designed with their needs and limitations in mind.

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### **Conflict of Interest Statement**

I declare no conflicts of interest regarding the research, data analysis, and manuscript preparation for this systematic review on vitamin D deficiency in Asian women and its correlation with lifestyle factors. This research was conducted with the sole aim of contributing to the scientific understanding of the topic and promoting public health awareness. No financial or personal interests have influenced the study's design, execution, or interpretation of results. The authors have received no external funding or support that could potentially create conflicts of interest in relation to this research.