

Polycystic Ovary Syndrome: A Public Health Perspective

¹Ugo Uwadiako ENEBELI, ²Okechukwu Kalu IRO

¹Department of Community Medicine, University of Port Harcourt Teaching Hospital, Nigeria

²Department of Public Health, Abia State University Uturu, Nigeria

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.9010130>

Received: 01 January 2025; Accepted: 06 January 2025; Published: 07 February 2025

ABSTRACT

Polycystic Ovary Syndrome (PCOS) is a clinical and public health issue and is the most common endocrine disorder that affect women of reproductive age globally. Despite its widespread occurrence, PCOS remains underdiagnosed and undertreated especially in low and middle-income countries (LMICs).

We aim to provide an in-depth analysis of PCOS from a public health perspective and to identify the global and regional prevalence, risk factors, and health outcomes associated with the condition. Additionally, the paper explores the healthcare response, including early diagnosis, management strategies, and prevention efforts, with a focus on improving health systems' ability to address PCOS effectively.

A comprehensive review of current literature, including peer-reviewed articles, clinical trials, and public health reports, was conducted. Data were extracted from multiple sources to highlight epidemiological details, health impacts, and healthcare interventions. Key statistics and findings were collated.

The prevalence of PCOS varied globally, across regions, and countries from 2.2% in China to 16.8(±8.5)% in Denmark. Women with PCOS face increased risks of infertility, type 2 diabetes, obesity, and mental health disorders such as depression and anxiety. While treatment options are available, accessibility and awareness remain significant barriers.

PCOS is a major public health concern with wide-ranging effects on women's health. Improved diagnosis, early intervention, and comprehensive healthcare policies are crucial to mitigating its impact. Public health strategies should focus on increasing awareness, enhancing diagnostic criteria, providing access to affordable treatments, and integrating mental health support for women affected by PCOS. Collaborative research efforts are required for a better understanding of the condition's epidemiology and to improve management approaches.

Keywords: Polycystic Ovary Syndrome, reproductive health, public health, women's health, healthcare systems, metabolic disorders

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is the most common endocrine disorder among women of reproductive age (Teede et al., 2023), and affects an estimated 4-20% [2%-26%] of this population (Dar et al., 2024; Joshi et al., 2024). The syndrome is characterized by a combination of symptoms that may include irregular menstrual cycles, hyperandrogenism, and the presence of ovarian cysts (Bai et al., 2024). PCOS extends beyond impacting fertility, to posing long-term health risks (Hussein et al., 2024). Up to 50–70% of women with PCOS have insulin resistance, 50% are overweight or obese and present with a 5-7-fold increased risk of type 2 diabetes (Chemaga Nkonpawa et al., 2021): these make PCOS a significant public health concern.

The exact etiology of PCOS remains unclear, but it is believed to involve a complex interplay of genetic, hormonal, and environmental factors; and its diagnosis can be challenging due to its clinically heterogeneous nature (Dar et al., 2024; Siddiqui et al., 2022). While PCOS is not life-threatening, it can exacerbate obesity,

insulin resistance, type 2 diabetes, cardiovascular diseases, and endometrial cancer that may culminate in life-threatening scenarios (Chauhan et al., 2024).

Despite its significant impact, up to 70% of women with PCOS remain undiagnosed, especially in low and middle-income countries (LMICs) where healthcare access and awareness are limited (Mohamed Rashid Sokwala & Dodia, 2024; World Health Organization, 2023). Additionally, the constantly evolving diagnostic criteria of PCOS make its diagnosis challenging (Chauhan et al., 2024). These underscore the need for increased awareness, better diagnostic tools, and more effective public health policies to address the condition.

From a public health perspective, PCOS presents significant challenges that necessitate coordinated efforts for early diagnosis, effective management, and advocacy for affected women. Understanding the prevalence, risk factors, and health implications of PCOS is crucial for developing targeted interventions.

Objectives

Our general objective is to explore PCOS from a public health perspective, and our specific objectives are to:

1. Examine the global and regional/national prevalence of PCOS.
2. Identify the primary risk factors and health outcomes associated with PCOS.
3. Evaluate current diagnostic criteria and healthcare interventions.
4. Explore the public health implications of PCOS, particularly in underserved regions.
5. Provide recommendations for improving PCOS management and prevention.

METHODOLOGY

This manuscript is based on a comprehensive review of recent literature on PCOS. Peer-reviewed articles, clinical studies, meta-analyses, and government/public health reports were analyzed. PubMed, Google Scholar, and Scopus databases were included, focusing on publications from 2020 to 2024. The key words included “polycystic ovary syndrome”, “prevalence of PCOS,” “epidemiology of PCOS,” “risk factors of PCOS”, “health outcomes of PCOS”, “diagnosis of PCOS”, “management of PCOS”, “prevention of PCOS”, identifying 3,740 studies, screened 1,050 of the studies, included 216 articles with the inclusion criteria. We focused on 29 articles that met the relevant quality and content assessment criteria.

The inclusion criteria were studies that:

- A. Focused on the epidemiology, diagnosis, treatment, or the public health aspect of PCOS.
- B. Included data on the prevalence and healthcare outcomes in various regions.
- C. Were conducted on women of reproductive age.
- D. Addressed the metabolic, reproductive, and psychological health outcomes of PCOS.

The exclusion criteria:

Studies that were outdated or did not address PCOS

Data were extracted from selected studies, focusing on prevalence, risk factors, health outcomes, and management approaches and presented in tables.

RESULTS

The results follow our objectives:

A. Examination of the global and regional/national prevalence of PCOS

The prevalence of PCOS varies across different regions and countries as shown in Table 1.

Table I Global and Regional/National Prevalence of Pcos

Region/Global Area	Prevalence of PCOS (%)	Source reference
Global	9.2 (6.8–12.5)	(Salari et al., 2024)
	9.8 (5.5-14.1)	(Neven et al., 2024)
Asia	11.37 (7.08, 15.67)	(Neven et al., 2024)
India	8.2 (2.74)	(Gupta et al., 2018)
China	2.2	(Ding et al., 2017)
Eastern Mediterranean	6.10 (2.26, 9.94)	(Neven et al., 2024)
Europe	4.30 (2.30, 6.30)	(Neven et al., 2024)
Denmark	16.8 (8.48)	(Lauritsen et al., 2014)
Region of the Americas USA	4.7	(Ding et al., 2017)
Mexico	6.6	Wolf et al 2018

B. Identify the primary risk factors and health outcomes associated with PCOS.

The primary risk factors for PCOS included:

Genetics: A family history of PCOS is a significant risk factor, suggesting a hereditary component to the disorder. There are up to 30 genes associated with PCOS (Christ & Cedars, 2023). However, there is no consensus on an established genetic marker for PCOS (Khan et al., 2019), and identifying causal gene variants will aid the understanding of the aetiology of PCOS.

Obesity and Insulin Resistance: Overweight/obese PCOS patients revealed higher insulin resistance and lower insulin sensitivity, and greater triglycerides and low-density lipoprotein cholesterol (Gholinezhad et al., 2018). Up to 50–70% of women with PCOS have insulin resistance, 50% are overweight or obese and present with a 5-7-fold increased risk of type 2 diabetes (Chemaka Nkonpawa et al., 2021).

Hyperandrogenism: Excessive production of androgen from the ovaries and adrenals is a hallmark feature of PCOS, and it clinically manifests as hirsutism, acne, alopecia, and/or increased amounts of testosterone (Ashraf et al., 2019).

Lifestyle Factors: Sedentary behavior and poor dietary habits exacerbate symptoms and health risks associated with PCOS. Specifically, there is an increased risk of PCOS with Western dietary patterns (including fast foods) and high-fat, low-fiber diets (Tchounwou et al., 2024).

Potential risk factors that preceded PCOS diagnosis include family history of PCOS, premature menarche, parity, race, weight gain, obesity, valproate use, metabolic syndrome, epilepsy, prediabetes, and types 1 and 2 diabetes (Christ et al., 2024).

The health outcomes associated with PCOS:

The health outcomes of PCOS are varied and impact multiple systems including:

Reproductive health: Approximately 90% of non-ovulatory infertility is caused by PCOS; additionally, PCOS

is associated with an increased risk of miscarriage (Li et al., 2022).

Circulatory system: Hypertension and cardiovascular disease have a 30% higher prevalence, cerebrovascular disease and myocardial infarction have a 40% higher prevalence, and peripheral vascular disease and congestive cardiac failure have a 50% higher prevalence in women with PCOS, compared to those without (Vine et al., 2023).

Endocrine-metabolic disorders: Studies have shown that 50-70% of women with PCOS experience insulin resistance 50% are overweight or obese. (Chemaga Nkonpawa et al., 2021). Type-2 diabetes had a 3-times higher prevalence, and dyslipidemia had a 2-fold increased prevalence in women with POS compared to women without PCOS (Vine et al., 2023).

Gastrointestinal conditions: All types of gastrointestinal disorders have increased prevalence in those with PCOS, including ulcerative colitis, inflammatory bowel syndrome, Crohn's disease, celiac disease, and non-alcoholic fatty liver disease (Kałużna et al., 2022; Vine et al., 2023).

Renal disease: Renal disease has a 30% higher prevalence in those with PCOS (Vine et al., 2023).

Mental Health: All types of mental diseases have a higher prevalence in those with PCOS including schizophrenia, psychosis and bipolar disorder. Dementia, depression, anxiety, eating disorders and body image issues are prevalent due to the physical and hormonal effects of PCOS (Vine et al., 2023).

Cancers: All malignancies have a 50% higher prevalence in those with PCOS, including colorectal cancer (Kałużna et al., 2022; Vine et al., 2023).

Respiratory system: All respiratory diseases have a 30% higher prevalence in those with PCOS, including chronic pulmonary diseases – asthma, bronchitis, emphysema, influenza, and pneumonia (Vine et al., 2023).

Other communicable diseases: AIDS/HIV and sexually transmitted diseases have significantly higher prevalence in those with PCOS (Vine et al., 2023).

C. Evaluate current diagnostic criteria and healthcare interventions.

The current diagnostic criteria:

The current guideline for assessing PCOS was published in 2023 as the '2023 International Evidence-based Guideline' and emphasizes a holistic approach including addressing emotional well-being (Teede et al., 2023). The current 2023 diagnostic guideline for PCOS requires two of three criteria: clinical/biochemical hyperandrogenism, ovulatory dysfunction, and polycystic ovaries from ultrasound or using anti-Müllerian hormone (AMH), excluding other disorders. This simplifies diagnosis as ultrasound or AMH are not needed if irregular periods and hyperandrogenism are present, this closely meets the specific requirements of adolescents and underserved populations (Teede et al., 2023).

Prior to the 2023 guideline, the 2018 International evidence-based PCOS guideline for assessment and management was in use across 196 countries, but an evaluation showed diagnosis was still delayed and the needs of PCOS patients not adequately met hence the update. The 2018 PCOS guideline had built on the consensus-based 2003 Rotterdam criteria for diagnosis of PCOS, which was preceded by the first attempt at clinical diagnostic criteria by the National Institute of Child Health and Human Development in 1990 (Christ & Cedars, 2023).

The Healthcare Response:

While there are effective symptomatic management options are available including lifestyle interventions (e.g. weight management and exercise), medications (such as metformin, combined oral contraceptives, anti-androgens, antidepressants), assisted reproductive technologies like in-vitro fertilization, and surgery (laparoscopic ovary drilling, bariatric surgery); access to these management options vary widely (Goldberg et

al., 2024; Tay et al., 2018). In high-income countries, PCOS management is often comprehensive, whereas in LMICs, a lack of awareness and limited healthcare infrastructure significantly hampers the ability to address PCOS effectively.

D. Explore the public health implications of PCOS, particularly in underserved regions:

PCOS poses a significant public health challenge worldwide. The public health implications of PCOS are enormous as it affects not only the individual women but also their families, community, health care systems and society at large. The implications of the associated reproductive, metabolic, and psychological disorders are significant and include a reduced quality of life (physical, mental, and social well-being) and increased loss of income from work absences (Ee et al., 2021; Joham & Teede, 2022).

The variation in prevalence rates and healthcare access across different regions underscores the need for tailored public health initiatives that consider cultural and socioeconomic factors. While some high-income countries have well-established guidelines and resources for managing PCOS, women in LMICs face significant barriers, including limited access to diagnostic tools and treatments. Additionally, cultural factors and lack of awareness about PCOS contribute to under-diagnosis and delayed treatment in these regions.

The public health implications for the neglected condition (PCOS) require suitable public health campaigns to create awareness for PCOS and risk factors, including for young PCOS patients and their parents to make them aware of future health implications (Prمودh, 2020). The epidemiology of PCOS implies the need for public health responses including health system strengthening for increased screening, health education, early diagnosis and management, and management of co-morbidities and lifestyle modifications.

E. Provide recommendations for improving PCOS management and prevention.

The recommendations include:

A. Increase Public Awareness: Launch public health campaigns to increase awareness of PCOS, particularly in underserved regions. This includes implementing community education programs to raise awareness about PCOS, its health implications, and available screening and management options.

B. Strengthen Healthcare Systems: Improve diagnostic facilities and treatment availability in LMICs, including establishing screening protocols in primary care settings to facilitate early diagnosis and management. Also, secondary and tertiary health centers should be strengthened to manage PCOS, as well as its complications.

C. Improve Access to Care: Improve access to healthcare services for women with PCOS, including multidisciplinary approaches that address both medical and psychological aspects. There is a need to establish/reactivate mental health care clinics in primary health settings.

D. Promote Mental Health Support: This involves integrating psychological counseling into PCOS treatment regimens.

E. Conduct Further Research/Research Funding: Support research on the global epidemiology of PCOS, its long-term health outcomes, and the development of cost-effective treatment options. Governments, non-governmental organizations, development partners, private firms and individuals should encourage research into the causes, management, and long-term health outcomes of PCOS to inform policy and practice.

CONCLUSIONS

PCOS presents significant challenges from a public health perspective, especially given the substantial number of women it affects worldwide, its long-term health implications and the strain it places on healthcare systems. A coordinated public health approach is essential to improve awareness, diagnosis, and management of PCOS, and ultimately enhance the quality of life for affected women. As a major public health issue, PCOS requires a comprehensive approach to management that includes early diagnosis, effective treatment options, mental health support, raising awareness, improving healthcare access, and integrating PCOS management into routine healthcare services.

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