

Brief communication

Epidemiological and clinical profile of pregnant women with anemia in a hospital in El Salvador

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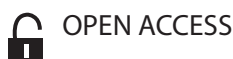
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Perfil epidemiológico y clínico de gestantes con anemia en un hospital público de El Salvador

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No conflicts of interest.

Abstract

Introduction. Anemia in pregnant women is a serious public health problem that affects 35.5 % of women globally, with repercussions for maternal and fetal health. **Objective.** Determine the epidemiological and clinical profile of pregnant women with anemia at a public hospital in El Salvador (2021–2023). **Methodology.** A descriptive, cross-sectional study was conducted based on clinical records from outpatient and inpatient care; 214 pregnant women with anemia were included. The sample size was calculated using Epi-Info 7.2.6.0, and participants were selected by simple random sampling. Data were collected using a structured questionnaire and processed using Excel® and PSPP 4.0. **Results.** 95.7 % of the pregnant women had mild to moderate anemia during the third trimester. The predominant characteristics were age 20–29 years (47.2 %), urban residence (55.1 %), multiparity (49.5 %), and normal weight (49.5 %). The most common red blood cell morphology was normocytic (71.5 %). 65.9 % were admitted for conditions such as urinary tract infection, threatened preterm labor, and preeclampsia. Of those who gave birth, 61.6 % had a vaginal delivery. **Conclusion.** The profile corresponds to young, urban, multiparous women of normal weight, with a predominance of anemia in the third trimester, in the presence of infectious and obstetric complications.

Keywords

Anemia, Pregnant Woman, Epidemiological Factors, Clinical Diagnosis.

Resumen

Introducción. La anemia en la mujer embarazada es un problema de salud pública grave que afecta al 35,5 %, a nivel global, con repercusiones en la salud materno-fetal. **Objetivo.** Determinar el perfil epidemiológico y clínico de gestantes con anemia en un hospital público de El Salvador (2021–2023). **Metodología.** Se realizó un estudio descriptivo, transversal, basado en registros clínicos de la consulta externa y hospitalización, se incluyó a 214 mujeres embarazadas con anemia. La muestra se calculó por Epi-info 7.2.6.0 y la selección por muestreo aleatorio simple. La recolección de datos fue mediante un instrumento estructurado y se procesaron con Excel® y PSPP 4.0. **Resultados.** El 95,7 % de las gestantes presentaron anemia leve a moderada, durante el tercer trimestre. Predominaron edades de 20-29 años (47,2 %), procedencia urbana (55,1 %) y peso normal (49,5 %). El tipo morfológico frecuente normocítico (71,5 %). El 65,9 % ingresó por enfermedades como infección urinaria, amenaza de parto prematuro y preeclampsia. De quienes verificaron parto, el 61,6 % fue vaginal. **Conclusión.** El perfil corresponde a jóvenes del área urbana, multipáras, con peso normal con predominio de anemia en el tercer trimestre, en presencia de morbilidades infecciosas y obstétricas.

Palabras clave

Anemia, Mujer Embarazada, Factores Epidemiológicos, Diagnóstico Clínico.

Introduction

Anemia in pregnant women is a serious and common public health problem that affects 35.5 % of this population globally,¹ with rates exceeding 40 % in developing countries; in El Salvador, it is found in 23 % of pregnant women.¹ “This condition, characterized by a hemoglobin (Hb)

concentration below 11 g/dL,² is primarily caused by iron deficiency resulting from inadequate dietary habits; however, physiological factors specific to pregnancy, sociodemographic variables,³ and associated diseases^{1,2} also play a role. The importance of addressing this condition lies in its direct impact on increased maternal and fetal morbidity.⁴⁻⁷

In El Salvador, health indicators such as high adolescent fertility rates and the persistence of maternal deaths due to hemorrhage and infections⁸ demonstrate that risk factors linked to anemia remain prevalent, posing an ongoing challenge for national health protocols.^{9,10}

Given this scenario, the World Health Organization (WHO) urges a deeper understanding of this disease, taking into account the geographic and cultural context, to comprehend the problem and improve health interventions.²

The main novelty and contribution of this study lies in the fact that it constitutes the first epidemiological and clinical characterization of pregnant women with anemia at the San Miguel National Hospital, a regional referral center serving more than one million residents in eastern El Salvador. To date, the burden of the disease and its distribution within this hospital population were unknown. By addressing this information gap, the study provides previously unpublished local statistical data that are crucial for moving away from late diagnosis, at the end of pregnancy, toward a strategy of timely detection and prevention beginning in primary care. For these reasons, the objective of this study was to determine the epidemiological and clinical profile of pregnant women with anemia who were treated at this institution between 2021 and 2023.

Methodology

A descriptive cross-sectional study based on hospital records was conducted, including pregnant women with anemia who were treated between January 1, 2021, and December 31, 2023, in outpatient clinics and during hospitalization at the San Miguel National Hospital in El Salvador.

Patients were identified in the online Morbidity and Mortality System database,¹¹ using the International Classification of Diseases, 10th Revision (ICD-10) code for anemia complicating pregnancy (099.0).¹²

The diagnosis of anemia was confirmed by Hb levels below 11 g/dL in the first and third trimesters and below 10.5 g/dL in the second trimester.¹³ Anemia was classified according to the hemoglobin values recommended by the WHO: In the first and third trimesters, it is classified as mild (10-10.9 g/dL), moderate (7-9.9 g/dL), and severe (<7 g/dL). In the second trimester, it is classified as: mild (9.5-10.4 g/dL), moderate (7-9.4 g/dL), and severe (<7 g/dL).¹³

The sample size was calculated using the StatCalc calculator in EpiInfo 7.2.6.0 (Population: 488, expected frequency: 50 %, 95 %

confidence interval, and margin of error: 5 %). Cases were selected using simple random probability sampling from the database records of patients with anemia for the study period, using Excel® version 2016. Inclusion criteria included: pregnant women with a physician-diagnosed case of anemia that met the WHO definition. Women diagnosed with other hereditary or acquired hemolytic diseases, those with multiple pregnancies, and those with incomplete data in their records were excluded.

A data collection instrument was designed, divided into three parts: the first part collected sociodemographic variables (age, educational level, nationality, marital status, place of origin); the second part, obstetric history (early prenatal registration: before 12 weeks; or late: after 12 weeks), parity, preterm birth, abortions, family planning, and family history (hypertension or diabetes *mellitus*); and the third part, follow-up variables (gestational age, body mass index [BMI], other diagnoses, hemoglobin and hematocrit levels, mode of delivery, ICU admission, and referral). The instrument was validated through a pilot study and expert review. Admission to the Intensive Care Unit (ICU) for pregnant women or postpartum women with anemia and other complications was defined based on the severity of the clinical condition, the need for monitoring, advanced life support, and specialized care.

Data were obtained by reviewing physical and electronic medical records from the Department of Medical Records and Statistics and were recorded using Google Forms.

Data processing was performed in Excel® 2016, and PSPP 4.0, the free version of SPSS®, was used for statistical analysis. The age variable was assessed using the Shapiro-Wilk normality test ($p < 0.01$). Because it did not follow a normal distribution, it was described using the median and interquartile range (IQR). Additionally, it was categorized into intervals and presented alongside the qualitative variables using frequencies and percentages.

International ethical guidelines for health-related research involving human subjects¹⁴ were followed, and approval was obtained from the Local Research Ethics Committee of San Juan de Dios National Hospital, San Miguel (Resolution 021-2024).

Results

Epidemiological characteristics

Between 2021 and 2023, 57 498 pregnant women were treated (41 541 in outpatient care and 15 957 hospitalized). Of these,

488 had anemia, and 214 were selected for the study. The median age was 24 years (IQR 18-29); the largest age group was 20-29 years (47.2 %). 61.2 % (131) had completed basic education; 3.7 % (8) were Honduran nationals, 66.4 % (142) were living with a partner, 55.1 % (118) were from urban areas, and 63.6 % (136) resided in the City of San Miguel (Table 1).

Obstetric and clinical characteristics

The data indicates that 59.8 % (128) of the patients registered for prenatal care early, 49.5 % (106) were multiparous, 0.9 % (2) had a history of preterm birth, and 11.7 % (26) had a history of miscarriage. Of the patients, 56.1 % (120) reported planning their pregnancy, while 41.2 % (88) indicated a family history of hypertension and diabetes (Table 2).

The data indicates that 1.86 % (4) had a gestational age of less than 14 weeks, 17.3 % (37) had a gestational age between 15 and 28 weeks, and 80.8 % (173) had a gestational age between 29 and 42 weeks. Based on BMI, 7 % (15) were classified as underweight, 49.5 % (106) as normal weight, 25.7 % (55) as overweight, and 17.7 % (38) as obese.

Anemia was observed in 17.2 % of patients, without any other accompanying conditions. Other conditions found in the patients studied were threatened preterm

labor in 3.3 % (7), endocrine disease in 2.3 % (5), urinary tract infections in 10.7 % (23), hypertensive disorders of pregnancy in 5.1 % (11), and obstetric hemorrhage in the first, second, and third trimesters in 1.4 % (3). In addition, 25.7 % (55) showed abnormalities in fetal well-being tests. Based on morphology (MCV, mean corpuscular volume), 71.5 % (176) of the anemias were normocytic, mostly in the third trimester; 27.7 % (59) were microcytic, diagnosed in the second and third trimesters, and 0.93 % (2) were macrocytic, diagnosed in the first and third trimesters (Table 2).

The therapeutic approach for pregnant women focused primarily on correcting mild and moderate anemia with iron supplements in 65.8 % (141) of cases and with iron sucrose in 22.4 % (48) of cases. Meanwhile, those with moderate and severe anemia received packed red blood cell transfusions in 11.2 % (24) of cases. The proportion of patients who went into labor was 34.1 % (73); of these, 61.6 % (45) had a vaginal delivery and 38.4 % (28) had a cesarean section. The percentage of patients admitted to the ICU was 3.3 % (7), and 0.9 % (2) were referred to a tertiary care center (Table 2).

Most patients with anemia were in the third trimester; 50.9 % (109) had a hemoglobin level of 10 to 10.9 g/dL (mild anemia), 44.8 % (96) had levels of 7 to 9.9 g/dL (moderate anemia), and 4.2 % (9) had a level below 7 g/dL (severe anemia) (Table 3).

Table 1. Epidemiological characteristics

Characteristics	Frequency N = 214	%
Maternal age	Median: 24.0 (IQR*: 18 - 29)	
	≤ 19 years	66
	20-29 years	101
	> 30 years	47
Educational level	High school	57
	Essential	131
	Higher education	5
	None	21
Nationality	Salvadoran	206
	Foreigner	8
Marital status	Common-law union	142
	Single	43
	Married	29
Department	San Miguel	136
	La Unión	26
	Morazán	24
	Usulután	22
	Others*	6
Origin	Urban	118
	Rural	96

*Other: San Vicente, Sonsonate

** Interquartile range (IQR)

Table 2. Obstetric and Clinical Characteristics

Characteristics		Frequency N=214	%
Prenatal registration	Early	128	59.8
	Late	86	40.1
Parity	Nulliparous	108	50.5
	Multiparous	106	49.5
Premature babies	0	212	99.1
	≥ 1	2	0.9
Abortions	Yes	26	11.7
	No	188	88.3
Pregnancy planning	Yes	120	56.1
	No	94	43.9
Family history	Yeah	88	41.2
	No	126	58.8
BMI	Low weight	15	7.0
	Normal weight	106	49.5
	Overweight	55	25.7
	Obesity	38	17.7
Admission diagnosis	Labor	73	34.1
	Diseases	141	65.9
Type of anemia by its morphology (MCV)	Normocytic	176	71.5
	Microcytic	59	27.7
	Macrocytic	2	0.9
Therapeutic approach	Iron supplement	141	65.8
	Iron sucrose	48	22.4
	Transfusions	24	11.2
Verified delivery (n=73)	Vaginal	45	61.6
	Caesarean section	28	38.4
Critical patient	Admission to ICU	7	3.3
	Reference to 3rd level	2	0.9

Discussion

This is the first study to characterize pregnant women with anemia at the National Referral Hospital in the Eastern Region of El Salvador. The main finding of the study was that almost all cases of anemia were classified as mild or moderate and were primarily detected during the third trimester, either during fetal well-being assessments or during labor. In contrast, cases of severe anemia did not exceed 5 % of the study population. These findings are consistent with Latin American^{15,16} and Asian^{17,18} studies that report a predominance of mild and moderate anemia during this period.

This pattern may reflect gaps in early detection^{16,19} nutritional follow-up,^{20,21} and prenatal monitoring,^{16,17} even among pregnant women receiving prenatal care. Due to these gaps, the identification of sociodemographic risks (age, place of origin, marital status)^{20,23,24} and other pregnancy-related factors, such as increased physiological iron

requirements and adherence to iron treatment,²⁵ may be compromised, as may the identification of deficient iron stores present from early stages of pregnancy or due to underlying medical conditions.^{5,19}

Likewise, the high frequency of cases during the third trimester, particularly in hospital settings, indicates that anemia continues to be identified in advanced stages of pregnancy, when maternal iron stores may be more severely depleted.^{21,25} The data obtained from classifying anemia based on MCV enrich the findings by identifying anemia as normocytic in the majority of cases.

In the study by Espitia FJ *et al.*, the data pointed toward microcytic anemia, which is common in cases of iron deficiency.¹⁵

Although most patients had a normal BMI, more than 40 % were obese or overweight at the start of pregnancy; these results were consistent with the proportions found by Ali *et al.* and Launbo *et al.*^{18,26} Obesity is associated with reduced iron

Table 3. Classification of anemia by severity

Gestational Age	WHO severity classification			Total N (%)
	Grade I/Mild	Grade II/Moderate	Grade III/Severe	
< 14 weeks	3	1	0	4 (1.9)
15-28 weeks	9	20	8	37 (17.3)
29-42 weeks	97	75	1	173 (80.8)
Total N (%)	109 (50.9)	96 (44.8)	9 (4.2)	214 (100.0)

absorption in the intestine due to increased levels of the hormone hepcidin and, consequently, may pose a risk for anemia.²⁷ The study cannot conclude that the patients have anemia due to their nutritional status, chronic disease, or inflammation. The most common conditions, alongside the diagnosis of anemia in the study population, were urinary tract infections; in some studies, in addition to these, other infections that are also common during pregnancy, such as bacterial vaginosis, vaginal candidiasis, gestational syphilis, human immunodeficiency virus infection, and parasitic infection, are mentioned; however, these could not be identified in the study population.^{15,21} The second most common condition was hypertensive disorders of pregnancy; some studies link preeclampsia to anemia as a secondary complication, which could explain the presence of these conditions in the study population.^{6,7}

The risk of preterm birth and obstetric hemorrhage in the first, second, and third trimesters is also considered a related condition; in Flores-Vanegas *et al.*, these were associated with an increased risk of anemia due to increased blood loss.⁵ In this study, pregnant women with anemia who required blood product transfusions, although they were a minority, were those diagnosed with these conditions.

These conditions should be taken into account during prenatal care at the community level and during any event requiring hospital care, in order to strengthen strategies for the prevention and timely detection of anemia.

Given the study's design limitations, the results pertain to a specific hospital population and do not necessarily represent all pregnant women in the country, the data focused solely on the epidemiological and clinical characteristics present in the medical records. Other variables, such as dietary habits, economic status, and micronutrient intake during prenatal care, were not taken into account, as these would have required investigation through an interview.

Additionally, some data did not allow for a more in-depth classification of anemia, as this information was not available in all

cases. In this regard, these findings should be further explored in future research on risk factors and health determinants to improve the preventive and curative measures currently being implemented at different levels of care. The epidemiological and clinical characterization of pregnant women with anemia made it possible to identify a population profile with risk factors previously described in the literature.

Conclusion

In conclusion, gestational anemia was observed most frequently in young, urban, multiparous women of normal weight who had been in contact with health services at some point. Mild-to-moderate anemia predominated in the third trimester and was most frequently accompanied by urinary tract infections, threatened preterm labor, and hypertensive disorders of pregnancy.

References

1. Organización Mundial de la Salud. Anemia en la mujer y niños. Ginebra. Organización Mundial de la Salud. March 28, 2025. Available at: https://www.who.int/data/gho/data/themes/topics/anaemia_in_women_and_children
2. Organización Mundial de la Salud. Anemia. Ginebra. Organización Mundial de la Salud. 2025. Date consulted: March 28, 2025. Available at: <https://www.who.int/news-room/fact-sheets/detail/anaemia>
3. Agarwal AM, Rets A. Laboratory approach to investigation of anemia in pregnancy. *Int J Lab Hematol*. 2021; 43(1): 65-70. DOI: 10.1111/ijlh.13551
4. Ayala F, Ayala D. Implicancias clínicas de la anemia durante la gestación. *Rev. peru. ginecol. obstet*. 2019;65(4):487-488. Available at: http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S2304-51322019000400012&lng=es.
5. Flores-Venegas SR, Germes-Piña F, Levario-Carrillo M. Complicaciones obstétricas y perinatales en pacientes anémicas.

- Ginecol Obstet Mex. 2019; 87(2):85-92. DOI: [10.24245/gom.v87i2.2436](https://doi.org/10.24245/gom.v87i2.2436)
6. Sutan R, Aminuddin N, Mahdy Z. Prevalence, maternal characteristics, and birth outcomes of preeclampsia: A cross-sectional study in a single tertiary healthcare center in greater Kuala Lumpur Malaysia. *Front. Public Health*. 2022;10:973271. DOI: [10.3389/fpubh.2022.973271](https://doi.org/10.3389/fpubh.2022.973271)
 7. Umiastuti P, Umijati S, Raissa S, Fadhil M, Raihani K, Fahdizar E, *et al*. The Relationship Between Anemia in Pregnant Women and The Incidence of Preeclampsia in Indonesia : A Systematic Review. *Journal of Community Medicine and Public Health Research*. 2024;5(1):99-111 DOI: [10.20473/jcmphr.v5i1.50098](https://doi.org/10.20473/jcmphr.v5i1.50098)
 8. Mesa I, Montoya S, Ochoa O. Prevalencia de anemia en la gestación y su relación con el peso al nacer. *Rev Bras Saude Mater Infant*. 2023;23(1):e20220333. Available at: <https://www.scielo.br/j/rbsmi/a/t8s4WwvrxFX6jfnZd6hsMS/?lang=es>
 9. Ministerio de Salud, Instituto Nacional de Salud. Encuesta Nacional de Salud 2021. San Salvador. Ministerio de Salud. 2021. 472 p. Available at: <https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1372915>
 10. Protocolos para la atención de la mujer en los períodos prenatal, parto, puerperio y atención del recién nacido. Ministerio de Salud. San Salvador, El Salvador. 2025. Available at: https://asp.salud.gob.sv/regulacion/pdf/otrosdoc/protocolosparalaatenciondelamujerenlosperiodosprenatalpartopuerperioyatenciondelrecien nacido-Acuerdo-Ejecutivo-1600-09062025_v1.pdf
 11. Sistema de Morbi Mortalidad en la Web. Ministerio de Salud. El Salvador. 2025. Date consulted: July 10, 2024. Available at: <https://simmow.salud.gob.sv/>
 12. Organización Panamericana de la Salud. Clasificación Estadística Internacional de enfermedades y problemas relacionados con la salud 10ª revisión. Washington, D.C. OPS. 2008. 1164 p. Available at: <https://ais.paho.org/classifications/chapters/pdf/volume1.pdf>
 13. World Health Organization. Guideline on haemoglobin cutoffs to define anaemia in individuals and populations. Geneva. WHO. 2024. 79 p. Available at: <https://www.who.int/publications/i/item/9789240088542>
 14. Organización Panamericana de la Salud y Consejo de Organizaciones Internacionales de las Ciencias Médica. Pautas éticas internacionales para la investigación relacionada con la salud con seres humanos, Cuarta Edición. Ginebra. 2016. OPS y CIOMS. 150 p. Available at: https://cioms.ch/wp-content/uploads/2017/12/CIOMS-EthicalGuideline_SP_INTERIOR-FINAL.pdf
 15. Espitia De La Hoz F, Orozco Santiago L. Prevalencia, caracterización y factores de riesgo de anemia gestacional en el Quindío, Colombia, 2018-2023. *Rev Colomb Obstet Ginecol*. 2024;75(3):4202. DOI: [10.18597/rcog.4202](https://doi.org/10.18597/rcog.4202)
 16. Gaspar S, Luna A, Carcelén C. Anemia en madres adolescentes y su relación con el control prenatal. *Rev Cubana Pediatr*. 2022;94(2):e1931. Available at: <https://www.medigraphic.com/pdfs/revcubped/cup-2022/cup223e.pdf>
 17. Abdilahi M, Kiruja J, Farah B, Abdirahman F, Mohamed A, Mohamed J, *et al*. Prevalence of anemia and associated factors among pregnant women at Hargeisa Group Hospital, Somaliland. *BMC pregnancy and childbirth*. 2024;24(1):332. DOI: [10.1186/s12884-024-06539-3](https://doi.org/10.1186/s12884-024-06539-3)
 18. Ali SA, Hassan AA, Adam I. History of Pica, Obesity, and Their Associations with Anemia in Pregnancy: A Community-Based Cross-Sectional Study. *Life*. 2023; 13(11):2220. DOI: [10.3390/life13112220](https://doi.org/10.3390/life13112220)
 19. Konje ET, Ngaila BV, Kihunrwa A, Mugassa S, Basinda N, Dewey D. High Prevalence of Anemia and Poor Compliance with Preventive Strategies among Pregnant Women in Mwanza City, Northwest Tanzania: A Hospital-Based Cross-Sectional Study. *Nutrients*. 2022; 14(18):3850. DOI: [10.3390/nu14183850](https://doi.org/10.3390/nu14183850)
 20. Barja-Ore J, Guillén-Calle B, Rodríguez-Clemente N. Diagnóstico y manejo de la anemia en el embarazo: estudio comparativo en mujeres de zonas urbanas y rurales. *Rev Obstet Ginecol Venez*. 2024;84(2):109-114. DOI: [10.51288/00840204](https://doi.org/10.51288/00840204)
 21. Zhang J, Li Q, Song Y, Fang L, Huang L, Sun Y. Nutritional factors for anemia in pregnancy: A systematic review with meta-analysis. *Frontiers in public health*. 2022;10:1041136. DOI: [10.3389/fpubh.2022.1041136](https://doi.org/10.3389/fpubh.2022.1041136)
 22. Balis B, Dessie Y, Debella A, Alemu A, Tamiru D, Negash B, *et al*. Magnitude of Anemia and Its Associated Factors Among Pregnant Women Attending Antenatal Care in Hiwot Fana Specialized University Hospital in Eastern Ethiopia. *Front. Public Health*. 2022;10(1):867888. DOI: [10.3389/fpubh.2022.867888](https://doi.org/10.3389/fpubh.2022.867888)
 23. Murillo A, Baque GH, Chancay CJ. Prevalencia de anemia en el embarazo tipos y consecuencias. *Dom Cien*. 2021;7(3):549-562. Available at: <https://dominiodelasciencias.com/ojs/index.php/es/article/view/2010>
 24. Valdiviezo W, Álvarez D, González C. Asociación del bajo peso al nacer con el control prenatal, la anemia materna y ser madre soltera. *Medisur*. 2024;22(1):21-29. Available at: <http://www.medisur.sld.cu/index.php/medisur/article/view/45126>

25. Mustafa A, Alanazi G, Alanazi M, Alenezi A, Alenzi M, Al-Muteri F, *et al.* Prevalence and Risk Factors of Anemia During Pregnancy in Saudi Arabia: A Systematic Review. *Cureus*. 2023;15:(11),e49287. DOI: [10.7759/cureus.49287](https://doi.org/10.7759/cureus.49287)
26. Launbo N, Davidsen E, Granich-Armenta A, Bygbjerg I, Sánchez M, Ramirez-Silva I, *et al.* The overlooked paradox of the coexistence of overweight/obesity and anemia during pregnancy. *Nutrition* (Burbank, Los Angeles County, Calif.). 2022;99-100:111650. DOI: [10.1016/j.nut.2022.111650](https://doi.org/10.1016/j.nut.2022.111650)
27. El-Mallah C, Beyh Y, Obeid O. Iron Fortification and Supplementation: Fighting Anemia of Chronic Diseases or Fueling Obesity? Current Developments in Nutrition. 2021;5(4):nzab032. Available at: [https://cdn.nutrition.org/article/S2475-2991\(22\)10529-9/fulltext](https://cdn.nutrition.org/article/S2475-2991(22)10529-9/fulltext)