

# Reproductive planning and the using Long-acting Reversible Contraceptives in Primary Health Care: a time series

O planejamento reprodutivo e o uso do contraceptivo de longa permanência na Atenção Primária à Saúde: uma série temporal

*Planificación reproductiva y uso de anticonceptivos de largo plazo en la atención primaria de salud: una serie de tiempo*

João Paulo Turri Brufatto<sup>1</sup> , Thais Machado Dias<sup>1</sup> , Natália Bortoletto D'Abreu<sup>1</sup> , Patricia Moretti Rehder<sup>1</sup> 

<sup>1</sup>Universidade Estadual de Campinas – Campinas (SP), Brasil.

## Abstract

**Introduction:** Long-acting reversible contraceptives (LARCs) have become cornerstones of modern reproductive planning. In Primary Health Care (PHC), LARCs are essential tools for comprehensive women's health care. The *Mais Médicos Campineiros* Program (PMMC), which introduced Family Practice (FP) residents into the health network, initiated a new paradigm in women's health care within PHC in Campinas, São Paulo, starting in 2020. **Objective:** To evaluate and compare indicators related to reproductive planning in PHC in the district of Sousas, in Campinas, and the city as a whole, before and after the introduction of FP residents. **Methods:** Data were extracted from the Tabnet-Campinas system and the Strategic Management of Materials and Medicines (GEMM) platform. Analyses focused on reproductive planning indicators and the acquisition and use of LARCs in PHC. **Results:** A 300% increase in the use of LARCs was observed in Sousas, along with a reduction in adolescent pregnancy rates, an increase in the frequency of prenatal consultations, and an improvement in maternal educational levels in both Sousas and Campinas in 2022. **Conclusions:** The introduction of the PMMC in 2020 led to a significant increase in the use of LARCs in PHC and a substantial improvement in reproductive planning indicators, highlighting the positive impact of integrating FP residents into the health system.

**Keywords:** Education, medical; Family development planning; Contraceptive agents; Primary health care; Health status indicators.

### Corresponding author:

João Paulo Turri Brufatto  
E-mail: jp.brufatto@gmail.com

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## Resumo

**Introdução:** Os contraceptivos de longa duração (LARCs, do inglês *Long-Acting Reversible Contraceptives*) têm se consolidado como pilares do planejamento reprodutivo moderno. Na Atenção Primária à Saúde (APS), os LARCs são ferramentas fundamentais para o cuidado integral à saúde da mulher. O Programa Mais Médicos Campineiro (PMMC), com a inserção de residentes de Medicina de Família e Comunidade (MFC) na rede de saúde, marcou um novo paradigma no cuidado à saúde da mulher na APS de Campinas (SP) a partir de 2020. **Objetivo:** Avaliar e comparar indicadores relacionados ao planejamento reprodutivo na APS do distrito de Sousas, em Campinas, e no município, na totalidade, antes e após a introdução de residentes de MFC. **Métodos:** Os dados foram extraídos do sistema Tabnet-Campinas e da ferramenta de Gestão Estratégica de Materiais e Medicamentos (GEMM). As análises abordaram indicadores relacionados ao planejamento reprodutivo e à aquisição e uso de LARCs na APS. **Resultados:** Houve um aumento de 300% no uso de LARCs em Sousas, acompanhado por redução nas taxas de gravidez na adolescência, aumento na frequência de consultas de pré-natal e melhora no nível de escolaridade materna em Sousas e no município de Campinas em 2022. **Conclusões:** Observou-se um aumento expressivo no uso de LARCs na APS e uma melhora significativa nos indicadores de planejamento reprodutivo após o início do PMMC em 2020, evidenciando o impacto positivo da inserção de residentes de MFC no sistema de saúde.

**Palavras-chave:** Educação médica; Planejamento familiar; Anticoncepcionais; Atenção primária à saúde; Indicadores básicos de saúde.

## Resumen

**Introducción:** Los anticonceptivos de larga duración (LARCs, por sus siglas en inglés *Long-Acting Reversible Contraceptives*) se han consolidado como pilares de la planificación reproductiva moderna. En la Atención Primaria de Salud (APS), los LARCs son herramientas fundamentales para el cuidado integral de la salud de las mujeres. El Programa *Mais Médicos Campineiros* (PMMC), que introdujo a residentes de Medicina Familiar y Comunitaria (MFC) en la red de salud, marcó un nuevo paradigma en el cuidado de la salud de las mujeres en la APS de Campinas, São Paulo, a partir de 2020. **Objetivo:** Evaluar y comparar indicadores relacionados con la planificación reproductiva en la APS del distrito de Sousas, en Campinas, y en el municipio en general, antes y después de la inclusión de residentes de Medicina Familiar y Comunitaria. **Métodos:** Los datos se obtuvieron del sistema Tabnet-Campinas y de la plataforma de Gestión Estratégica de Materiales y Medicamentos (GEMM). Los análisis se centraron en indicadores relacionados con la planificación reproductiva y la adquisición y uso de LARCs en la APS. **Resultados:** Se observó un aumento del 300% en el uso de LARCs en Sousas, junto con una reducción en las tasas de embarazo adolescente, un aumento en las consultas prenatales y una mejora en el nivel educativo de las madres en Sousas y Campinas en 2022. **Conclusiones:** La introducción del PMMC en 2020 resultó en un aumento significativo en el uso de LARCs en la APS y en una mejora sustancial de los indicadores de planificación reproductiva, destacando el impacto positivo de la integración de residentes de MFC en el sistema de salud.

**Palabras clave:** Educación médica; Planificación familiar; Anticonceptivos; Atención primaria de salud; Indicadores de salud.

## INTRODUCTION

In Brazil, family planning policy designates it as the responsibility of the State to guarantee citizens' access to information, means, methods, and techniques for reproductive planning, in accordance with the 1988 Federal Constitution.<sup>1</sup> At the 1947 International Conference on Population and Development, health was defined as a state of complete physical, mental, and social well-being.<sup>2</sup> It was also established that all individuals should have the right to a safe and satisfying sexual life, along with the ability to reproduce, and the freedom to determine the timing and number of pregnancies.<sup>2</sup> Within this framework, contraceptive methods are recognized as fundamental tools for ensuring these rights.

The quality of women's health care in a country can be evaluated through various indicators, including rates of unplanned pregnancies, teenage pregnancies, and the educational level of pregnant women.<sup>3</sup> Unplanned pregnancies are associated with increased maternal and infant mortality rates, while teenage pregnancy, often correlated with low educational attainment, tends to perpetuate cycles of poverty in low-income families, thereby directly influencing a nation's socioeconomic profile.<sup>3</sup>

Primary Health Care (PHC), the main entry point to the Brazilian Unified Health System (*Sistema Único de Saúde – SUS*),<sup>4</sup> plays a central role in disseminating information about various contraceptive methods.<sup>5</sup> As such, it constitutes a key pillar of reproductive planning within the public sector.<sup>4,5</sup> In this

context, the city of Campinas (São Paulo – SP) launched a new primary care policy in 2020, incorporating resident physicians specializing in Family Practice (FP) into the healthcare network through the Mais Médicos Campineiros Program (PMMC).<sup>6</sup> This initiative aims to promote specialty training through residency programs, with particular emphasis on women's health and reproductive planning.<sup>6</sup>

In the Sousas district of Campinas, two resident physicians were assigned through the PMMC in 2020 and five in 2021. The district has approximately 32,000 inhabitants, one Basic Health Unit (*Unidade Básica de Saúde* – UBS), and several areas characterized by social vulnerability.<sup>7</sup> The local population has become increasingly reliant on SUS, with a significant portion also dependent on the Bolsa Família program.<sup>7</sup> In this context, indicators such as adolescent pregnancy rates, maternal education levels, and the number of prenatal consultations warrant careful analysis, particularly in light of changes to the primary care model introduced by PMMC and the impact of the COVID-19 pandemic between 2020 and 2021.

Among the various contraceptive methods distributed by SUS, the Copper Intrauterine Device (Cu-IUD) remains one of the least widely used globally.<sup>8</sup> Classified as a long-acting reversible contraceptive (LARC), it is effective for approximately 10 years and offers high efficacy, with pregnancy rates below 0.4% in the first year of use.<sup>9,10</sup> Cu-IUD is recommended for all women seeking reliable contraception, including adolescents, nulliparous women, postpartum or post-abortion patients, and those with comorbidities that contraindicate hormonal methods.<sup>9,10</sup> Despite the existence of over 48,000 UBS within SUS, only 18,243 Cu-IUD insertions were reported in primary care in 2021,<sup>11</sup> underscoring the need to expand access to this method.

Another important method is the etonogestrel implant, a LARC that remains effective for three years and has lower failure rates than tubal ligation.<sup>9</sup> However, its availability within SUS is limited, being offered in Campinas only to women who meet the criteria established by Ministry of Health Ordinance No. 13/2021.<sup>12</sup> This restriction reflects broader barriers to LARC use in PHC, including inadequate counseling, misinformation about contraceptive methods, false contraindications, and insufficient technical training.<sup>13-16</sup>

It is therefore essential to implement policies within UBS that address existing barriers and promote the use of LARCs. The integration of medical residents into primary care and the training of specialists to perform these procedures represent promising strategies for expanding access to such methods.<sup>6</sup> In light of the State's and the Campinas (SP) Primary Care Unit's responsibility for reproductive planning, this study aimed to evaluate indicators related to reproductive planning in Sousas and Campinas between 2019 and 2022, before and after the introduction of primary care residents, as well as the use of LARCs at the UBS in Sousas. The objective was to encourage discussion on the topic and explore potential implications of PMMC within the local healthcare network.

## METHODS

This is a descriptive and analytical ecological/time series study, conducted using secondary data from the Health Information System (TABNET-Campinas) and the Strategic Management of Materials and Medicines (*Gestão Estratégica de Materiais e Medicamentos* – GEMM) system. The study was carried out in the municipality of Campinas, which has a population of approximately 1,200,000 inhabitants, including 32,000 residents in the district of Sousas.<sup>7</sup>

Between 2019 and 2022, data were collected from TABNET-Campinas<sup>217</sup> to evaluate indicators prior to the implementation of the PMMC in 2020 and following the completion of the researcher's residency in 2022. Concurrently, in collaboration with local pharmacy staff, data were extracted from the GEMM system regarding the dispensing of Cu-IUDs from 2018 to 2022, as well as subdermal etonogestrel implants (Implanon), from their introduction into the network in May 2022 through December of the same year.

Residents participating in the PMMC program receive training and certification for Cu-IUD insertion during the first month of residency. Additionally, they have the opportunity to obtain certification for the insertion of the etonogestrel subdermal implant through training provided by Universidade Estadual de Campinas (UNICAMP). However, due to local management decisions, the insertion of Implanon was restricted to a single gynecologist at the unit, despite residents being qualified to perform the procedure.

Variables related to reproductive planning were obtained from the TABNET-Campinas system and included the following:

- Percentage of the number of prenatal care visits in relation to the total number of pregnant women in Campinas and Sousas between 2019 and 2022, based on data extracted from the Live Birth Information System (*Sistema de Informações sobre Nascidos Vivos – SINASC*);
- Birth rate by age group in Campinas and Sousas between 2019 and 2022 (SINASC);
- Percentage of educational level of pregnant women in Campinas and Sousas between 2019 and 2022, also based on SINASC.

The following data were extracted from the GEMM system:

- Absolute numbers of Cu-IUDs dispensed annually between 2018 and 2022 by the nursing team at the Sousas UBS;
- Absolute numbers of etonogestrel implants dispensed monthly between May and December 2022 by physicians.

Data were stored anonymously in a database created using Excel for Windows, where graphics were generated to monitor the evolution of LARC use throughout the study period. Additional graphs for reproductive planning indicators were produced using PrismaFive software. Descriptive statistical analyses, including means, standard deviations, and absolute and relative frequencies, were performed by a staff statistician in collaboration with the researcher.

From the perspective of a resident assigned to Sousas between 2021 and 2022, the study also employed an intervention research model. This approach aimed to integrate scientific inquiry with practical action, enabling the promotion of change within the studied context while simultaneously collecting data and analyzing the phenomena under investigation.<sup>18-20</sup>

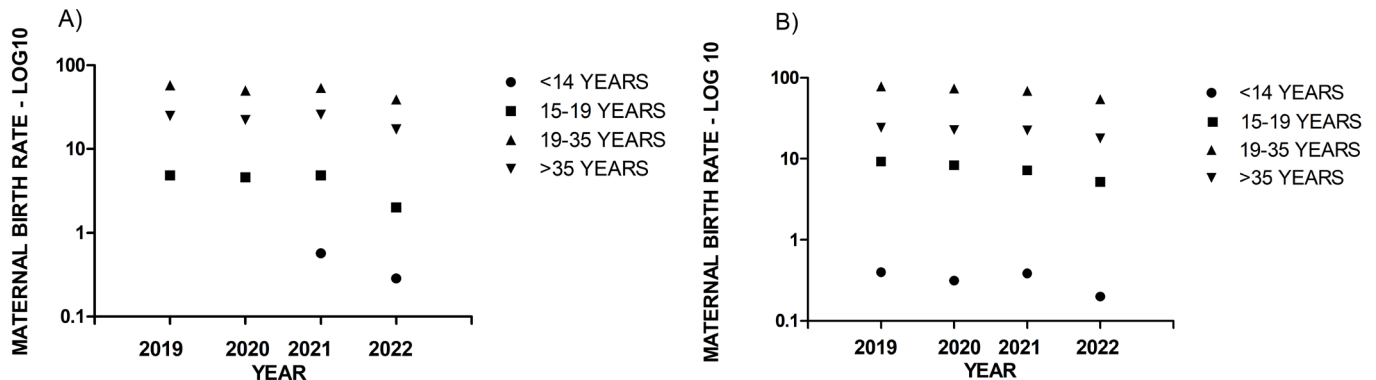
The study adhered to the principles of the Declaration of Helsinki and the guidelines established by Resolution 466/12 of the National Health Council (*Conselho Nacional de Saúde – CNS*), which regulate research involving human subjects. The protocol was approved by the Research Ethics Committee of the School of Medical Sciences at UNICAMP and by the Research Committee of the DTG/CAISM under protocol number 59440022.5.0000.5404. This study is part of a larger project developed by the researcher.

## RESULTS

### Reproductive planning indicators

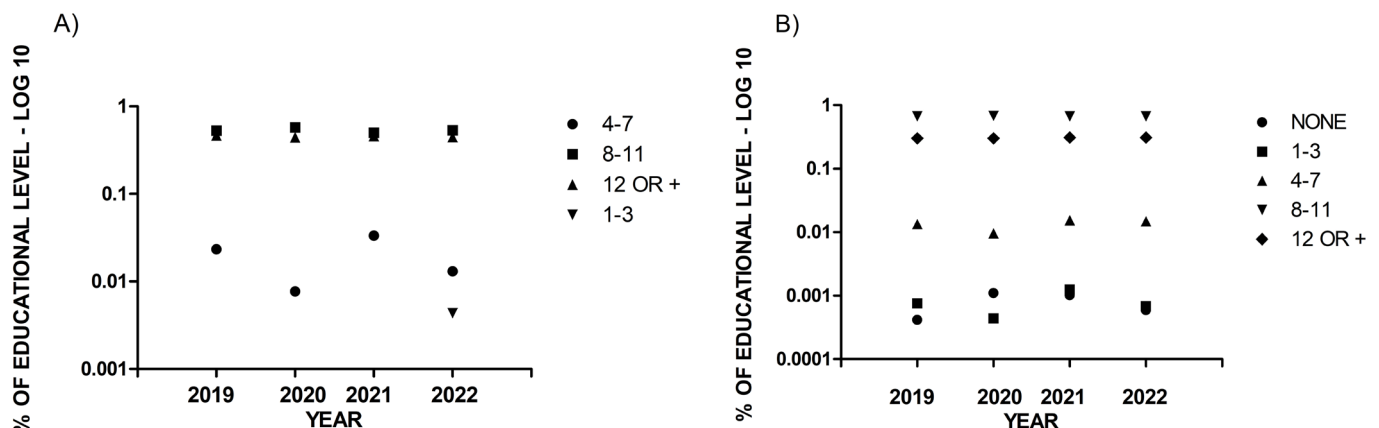
Using the TABNET-Campinas system, it was possible to compare indicators related to teenage pregnancy, maternal education, and the number of prenatal consultations among women in the district of Sousas (a) and the municipality of Campinas (b), as illustrated in the graphics presented in this study.

In Graphic 1, section “a” shows a 50% reduction in pregnancies among girls under the age of 14 and a 60% reduction among adolescents aged 15 to 19 in Sousas when comparing data from 2021 to 2022. Overall, a progressive decline in pregnancies among women under 19 was observed throughout the study period. In section “b,” a 48% reduction in pregnancies among girls under 14 and a 28% reduction among adolescents aged 15 to 19 were recorded in Campinas during the same period, indicating improvement in this area as well.



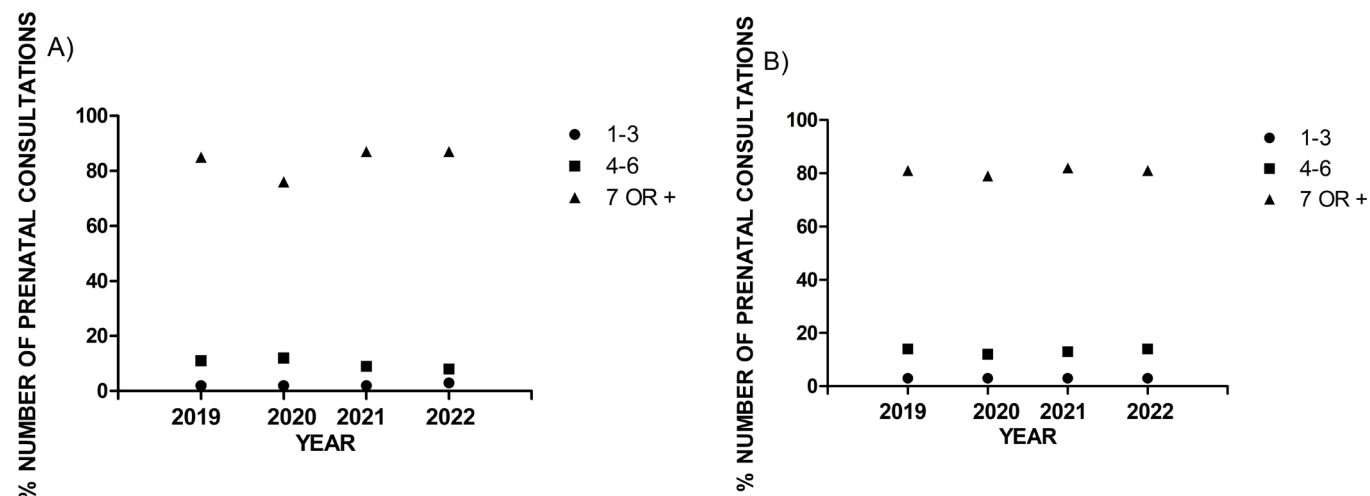
**Graphic 1.** Pregnancies by age group in (a) Sousas and (b) Campinas between 2019 and 2022.

In Graphic 2, section “a” shows a 60% reduction in the number of mothers with 4 to 7 years of schooling, a 6% increase in those with 8 to 11 years, and a 2% decrease in the group with 12 or more years of schooling when comparing 2021 to 2022. A general decline in low maternal education levels was observed in Sousas over the study period. In section “b,” the data reveal a 45% decrease in the group with no formal education and a 45% reduction in those with 1 to 3 years of schooling. There was a 2% increase in the group with 4 to 7 years of education, while the proportions remained stable in the groups with 8 to 11 years and 12 or more years of schooling. Overall, a reduction in low maternal education was also observed in Campinas.



**Graphic 2.** Maternal educational level in (a) Sousas and (b) Campinas between 2019 and 2022.

In Graphic 3, section “a” shows an increase of approximately 15% in the proportion of mothers who attended seven or more prenatal appointments when comparing 2020–2021 to 2020–2022 in Sousas. This indicates a rise in prenatal care coverage during the study period. In section “b,” the data reveal an approximate 4% increase in the number of mothers with seven or more prenatal appointments over the same period, also reflecting an improvement in Campinas.



**Graphic 3.** Proportion of prenatal consultations in (a) Sousas and (b) Campinas between 2019 and 2022.

Tables 1 and 2 present the absolute numbers related to prenatal consultations, maternal education levels, and maternal age in Sousas and Campinas, respectively.

**Table 1.** Prenatal consultations, educational level, and maternal age during pregnancy in Campinas (2019–2022).

Number of prenatal consultations	Year			
	2019	2020	2021	2022
1-3	444	448	428	420
4-6	1,991	1,746	1,692	1,714
7 or +	11,839	10,097	10,551	10,355
Maternal educational level (years)	2019	2020	2021	2022
None	6	15	13	6
1-3	11	6	16	7
4-7	195	130	198	185
8-11	9,864	9,276	8,586	8,516
12 or +	4,452	4,174	3,988	3,977
Maternal age (years)	2019	2020	2021	2022
<14	52	41	50	36
15-19	1,203	1,083	935	800
20-35	10,172	9,555	8,932	8,883
>35	3,151	2,955	2,922	2,909

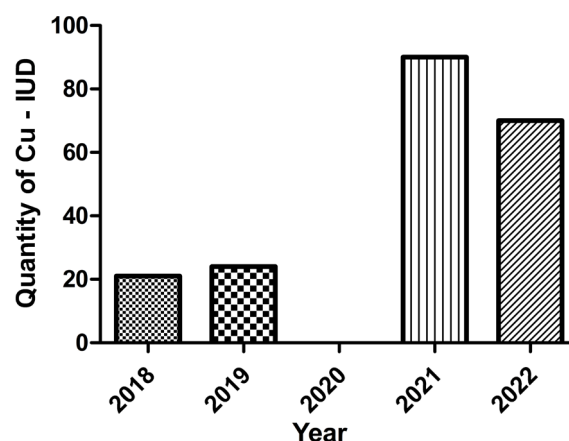
## Incidences assessed

### *Cu-IUD*

Analysis of copper intrauterine device dispensing data from the GEMM system reveals an increase of approximately 300% in 2021 and 200% in 2022 compared to 2019 and 2018, respectively (Graphic 4). Between 2021 and 2022, 5% of the Cu-IUDs were inserted by gynecologists at the Sousas unit, while the remaining insertions were performed by PMMC residents.

**Table 2.** Prenatal consultations, educational level, and maternal age during pregnancy in Sousas (2019–2022).

Number of prenatal consultations	Year			
	2019	2020	2021	2022
1-3	7	7	7	7
4-6	35	33	27	25
7 ou +	252	205	263	250
<b>Maternal educational level (years)</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
1-3	0	0	0	1
4-7	7	2	10	4
8-11	159	150	151	152
12 ou +	140	116	138	120
<b>Maternal age (years)</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
<14	0	0	2	1
15-19	17	16	17	8
20-35	202	175	190	183
>35	87	78	90	78

**Graphic 4.** Absolute number of Cu-IUDs in stock at the Sousas UBS (2018-2022).

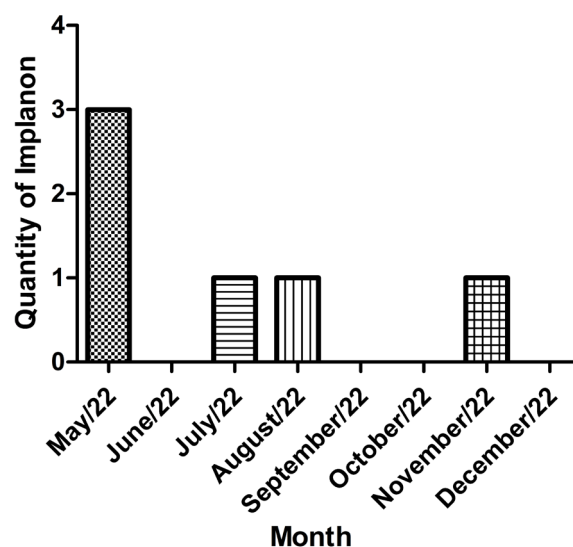
### Implanon

At the Sousas Health Center, five subdermal etonogestrel implants were inserted by the unit's gynecologist between May and December 2022 (Graphic 5). A high demand was observed during the initial month of availability (May), followed by a marked decline in insertions in the subsequent months (June to December).

## DISCUSSION

This study examined indicators obtained from the TABNET-Campinas system, acknowledging that reproductive planning extends beyond the adoption of contraceptive methods to include socioeconomic factors and aspects of local management. Following 2020, Graphic 1 illustrates a reduction in pregnancies among adolescents under the age of 19. Graphic 2 indicates an improvement in maternal education levels, with decreases in the number of pregnancies among mothers with no formal education, 1 to 3 years of schooling, and 4 to 7 years of schooling.





**Graphic 5.** Absolute number of etonogestrel implants dispensed at the Sousas UBS (May to September 2022).

Graphic 3 demonstrates a notable increase in prenatal consultations, particularly among mothers who attended seven or more appointments in 2022 compared to 2019. Additionally, a significant rise in Cu-IUD use was observed, with a 300% increase in 2021 and a 200% increase in 2022 relative to 2018 and 2019.

These results suggest a potential improvement in reproductive planning in Campinas, contributing to safer pregnancies and enhanced socioeconomic development for women, as previously reported by Martinez et al.<sup>21</sup> However, persistent challenges, such as limited access to education, insufficient contraceptive counseling by PHC professionals, and inadequate provision of prenatal consultations due to an undersized UBS network, continue to hinder more substantial progress. These issues reflect the programmatic vulnerability described by Fernandes<sup>22</sup> and Campos and Amaral,<sup>4</sup> particularly in Sousas, a district with approximately 35,000 residents, served by a single UBS, five Family Health Strategy (FHS) teams, and no nearby emergency care facility.<sup>7</sup>

Previous studies, such as the one conducted by Brufatto et al.,<sup>16</sup> provided a detailed analysis of the study population, revealing that the majority of women who opted for LARCs between 2021 and 2022 were married and between 18 and 40 years of age. Although this finding may appear to contrast with the observed reduction in teenage pregnancies, it is believed that the dissemination of information on contraceptive methods has played a fundamental role in education and in combating misinformation, thereby benefiting women across all age groups.<sup>16</sup> This may account for the reduction in teenage pregnancies, even in the absence of significant LARC insertion within this demographic.

Another important consideration is the need for more structured management, in alignment with the principles outlined by Donabedian.<sup>23</sup> Barriers such as poorly defined workflows for Cu-IUD and Implanon insertion, misplaced waiting lists, lack of necessary equipment, and the unavailability of contraceptive supplies were challenges identified at the UBS in Sousas.<sup>16</sup> Studies conducted in both Brazil and England support the notion that reducing bureaucratic obstacles can enhance the distribution, acquisition, and accessibility of contraceptive methods, thereby encouraging choices such as the Cu-IUD.<sup>24-27</sup>

Despite the challenges, an increase in the use of LARCs was observed in Sousas in 2021 and 2022, as demonstrated by the rise in Cu-IUD insertions (Graphic 4). It is believed that the implementation of the PMMC contributed to a reorganization of the work environment, helping to overcome previously existing barriers.<sup>25</sup> Studies indicate that residency programs integrating clinical practice and education can enhance service delivery and promote positive changes.<sup>28,29</sup> Additionally, the increase in FP residents within the



Campinas PHC system may be associated with improvements in the indicators analyzed. The person-centered approach, the development of individualized therapeutic projects,<sup>4,30</sup> and the expanded clinical model<sup>31</sup> introduced by resident physicians may have contributed to the progress observed. Finally, it is important to note the negative impact of the COVID-19 pandemic on local health planning, as evidenced by the absence of Cu-IUD implementation in 2020. This situation may reflect a lack of prioritization of contraception and women's reproductive health in the region during the pandemic.

With regard to the use of Implanon, a recent contraceptive technology intended for populations facing significant social vulnerability, local authorities adopted a restrictive protocol that limited device insertion to a select group of gynecologists. In 2022, despite being trained and certified, FP residents were not permitted to perform insertions, resulting in only five implants being placed between May and December of that year. This approach diverges from international guidelines and may have contributed to the low uptake of this method in areas such as Sousas, which are marked by pronounced social inequalities.

Finally, from the perspective of intervention research as described by René Lourau,<sup>18</sup> this study reflects the researcher's immersion in the local context, enabling the transformation of the investigated environment. Although a lack of neutrality is inherent to this methodological approach, it fosters a closer integration between theory and practice, allowing for deeper and more effective interventions. In this way, by examining changes in reproductive planning in Campinas, the study offers a unique perspective that bridges medical practice and scientific research.

In conclusion, a substantial increase in the use of LARCs in PHC and improvements in reproductive planning were observed following the implementation of the PMMC in 2020, marked by the inclusion of the FP residency within the local network. Further research is needed to expand understanding of the program's impact and to evaluate its potential for replication in other settings.

## Study limitations

The Sousas district has a relatively small population, whereas the city of Campinas is characterized by considerable demographic heterogeneity. This diversity may limit the comparability between the two locations and restrict the generalizability of the findings. In 2020, the COVID-19 pandemic had a multidimensional impact on public health, which may have adversely affected reproductive planning data between 2020 and 2021. The improvements observed in 2022 may be partially attributed to the end of the pandemic and the gradual resumption of regular health services. An additional limitation concerns the data collection period, which concluded in November 2022. As a result, the exclusion of December may have led to an underestimation of the analyzed variables.

## CONFLICT OF INTERESTS

Nothing to declare.

## AUTHORS' CONTRIBUTIONS

JPTB: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing

– Original Draft. TMD: Conceptualization, Investigation, Validation, Visualization. NBD: Data Curation, Methodology, Supervision. PMR: Formal Analysis, Writing – Original Draft, Validation.

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