

# Drastic Reduction in Household Income following the SARS-CoV-2/COVID-19 Pandemic: Impact on Birth Rates in Italy and on Access to Assisted Reproduction Techniques (ART) in Lazio: Short Review and Observational Study

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## Abstract

**Objectives:** The aim of the study was to evaluate the consequences of the health emergency and the consequent restrictive measures on the economic accessibility of medically assisted procreation techniques. **Design:** The results were obtained by administering an online survey consisting of 20 multiple-choice questions, which the participants answered anonymously. **Setting and Participants:** This is a transversal observational study conducted at the Medically Assisted Procreation Center of the San Filippo Neri hospital in Rome. 295 patients were enrolled with an overall average age of 37.5 years (minimum age 25, maximum age 47), of these 88.5% were women and 11.5% were men. Main outcome measures. Withdraw from ART treatment. Reduction of the family income rate. **Results:** Most of all, they said they had not seen their desire for offspring reduce since the onset of the health emergency. The willingness to use ART techniques during the pandemic remained unchanged for 58.7% of respondents, increased for 12.5% and decreased for the remaining 28.8%. The individuals who have declared that they have momentarily renounced the procedures of PMA have been 31.7%, of which 24% have renounced because of economic factors. When asked about the cost of the necessary medical procedures, 62.5% of the participants considered the price in public facilities to be “adequate” and 79.8% defined the cost in private clinics as “excessive”. **Conclusions:** Our findings show that the pandemic and the resulting economic and social restrictions have affected access to ART techniques, as well as the desire to become parents.

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## Keywords

ART, COVID-19, Pandemy, PMA

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## 1. Introduction

### 1.1. Consequences of the Pandemic on Income

On March 11, 2020, the World Health Organization officially declared the SARS-CoV-2 infection a pandemic. This historic declaration led the Italian government to implement a set of restrictive measures that significantly impacted the freedom of movement for individuals.

These measures had dramatic economic repercussions, particularly affecting freelance workers and those with fixed-term contracts. Only workers with indefinite contracts benefited from extraordinary measures implemented by the government to preserve employment during the pandemic emergency.

A similar situation was observed in the health and social assistance sector, despite the increasing and urgent care needs related to the pandemic. The manufacturing sector, which constitutes approximately 20% of the total workforce, maintained stable employment levels, primarily due to extensive use of furlough schemes and extraordinary measures to preserve employment during the pandemic emergency.

The health crisis resulting from the pandemic inevitably altered the work environment and the delivery of services. The search for a balance between preventing the spread of the pandemic in workplaces and the need to provide services encouraged the legislature to enact measures to facilitate and streamline the implementation of the so-called “smart working.” Consequently, the number of workers adopting this method increased from just over 1 million to over 4 million in a few months.

However, despite these measures, the economic crisis caused by the pandemic inevitably led to a worsening of absolute poverty conditions. In 2020, over 2 million families (7.7% of the total, up from 6.4% in 2019) and over 5.6 million individuals (9.4%, up from 7.7%) were in this condition. After the improvement recorded in 2019, the effect of the pandemic increased the absolute poverty index, making it the highest since 2005 [1].

Regarding relative poverty, there were just over 2.6 million families below the threshold (10.1%, down from 11.4% in 2019). As a natural and dramatic consequence of the average impoverishment of the population, there was a decrease in birth rates throughout the national territory [2].

In 2020, the new births among the resident population were 404,892, about 15,000 less than in 2019 (−3.6%). However, it is essential to specify that this negative trend predates the SARS-CoV-2 pandemic; indeed, since 2008, births have decreased by 171,767 units (−29.8%).

The decline is primarily attributable to births from couples with both Italian parents (316,547 in 2020, over 163,000 fewer than in 2008). More specifically, this phenomenon has multifactorial origins, leading to significant changes in the female population of childbearing age, conventionally set between 15 and 49 years [3].

Firstly, the so-called baby boomers (women born between the second half of the 1960s and the first half of the 1970s) are progressively leaving or concluding the reproductive phase. Secondly, younger generations are becoming less numerous, facing the effects of the baby bust, a period of sharp decline in fertility from 1976 to 1995, reaching a historic low of 1.19 children per woman in 1995. Thus, it is undeniable that Italian women of childbearing age are becoming less numerous.

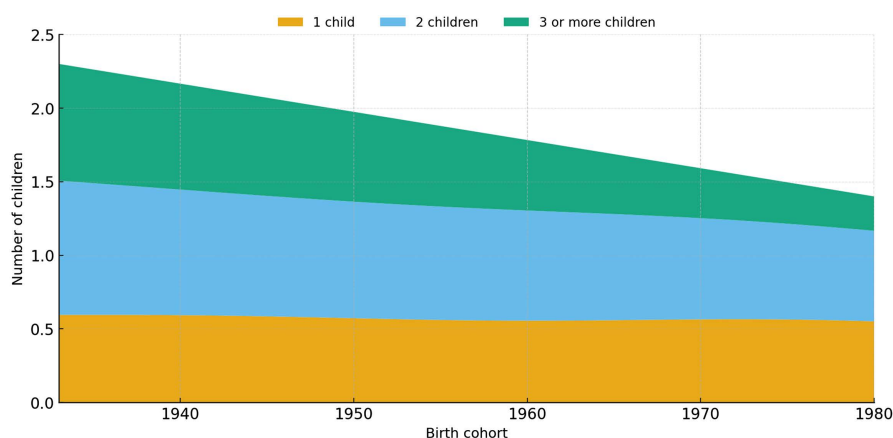
Since the 2000s, immigration has partially mitigated the effects of the baby bust by introducing a young population. However, the positive contribution of young immigrant women is gradually losing effectiveness as they also experience the consequences of social phenomena leading to the impoverishment of Italian women of childbearing age as they age.

Specifically, the births within marriage are decreasing, totaling 259,823 in 2020, nearly 20,000 less than in 2019, and a 44.0% decrease compared to 2008. Subsequent studies, unfortunately, showed that this negative trend continued in 2021. According to provisional data for the January-September period, births were about 12,500 less than the same period in 2020, almost double the decrease recorded in the same period the previous year. This significant decrease was related to the negative effects triggered by the SARS-CoV-2 pandemic, which in January 2021 alone recorded the largest drop ever (almost 5,000 fewer births, -13.6%).

Analyzing more precisely the consequences of the SARS-CoV-2 pandemic on birth rates, it was observed that, although births decreased by 2.5% in the first ten months of 2020, in line with the trend from 2009 to 2019 (-2.8% on average annually), this decline markedly accelerated in November (-8.3% compared to the same month the previous year) and, especially, in December (-10.7%), corresponding to conceptions during the early months of the epidemic wave.

The situation is even more dramatic in the north-western regions of Italy, most affected by the pandemic during the first wave, where birth rates in December dropped by 15.4%. Undoubtedly, uncertainty in the health and economic sectors and lockdown-related restrictions have increasingly led Italian and immigrant families to postpone their conceptions. Supporting this hypothesis, January 2021 saw the maximum reduction in births nationwide (-13.6%), with the peak in the southern regions (-15.3%). This decline continued, albeit to a lesser extent, in February 2021 (-4.9%). Unfortunately, less optimistic projections show that this negative trend, stimulated by the pandemic, could persist beyond its conclusion. The only encouraging data, confirmed by a study from our department, was the spontaneous conception rate in couples on the waiting list for assisted reproduc-

tive techniques, reaching 15%, a figure comparable to unexplained infertility; this data was correlated with the increase in sexual intercourse due to domestic confinement (**Figure 1**) [4].



**Figure 1.** Total fertility by order of birth and generation (Women aged 15 - 49 born between 1933 and 1980).

Fortunately, the increase in births observed in March, probably attributable to the population's belief in overcoming the health emergency, led to a slight reversal of the trend with an increase in births compared to the same month of the previous year (+4.5%); these were births conceived during the transition phase between the two epidemic waves of 2020 [5].

The trend of births remained weakly positive in April (+1%), only to collapse, especially in June (-5.9%) and July (-5.8%), corresponding to conceptions during the second epidemic wave.

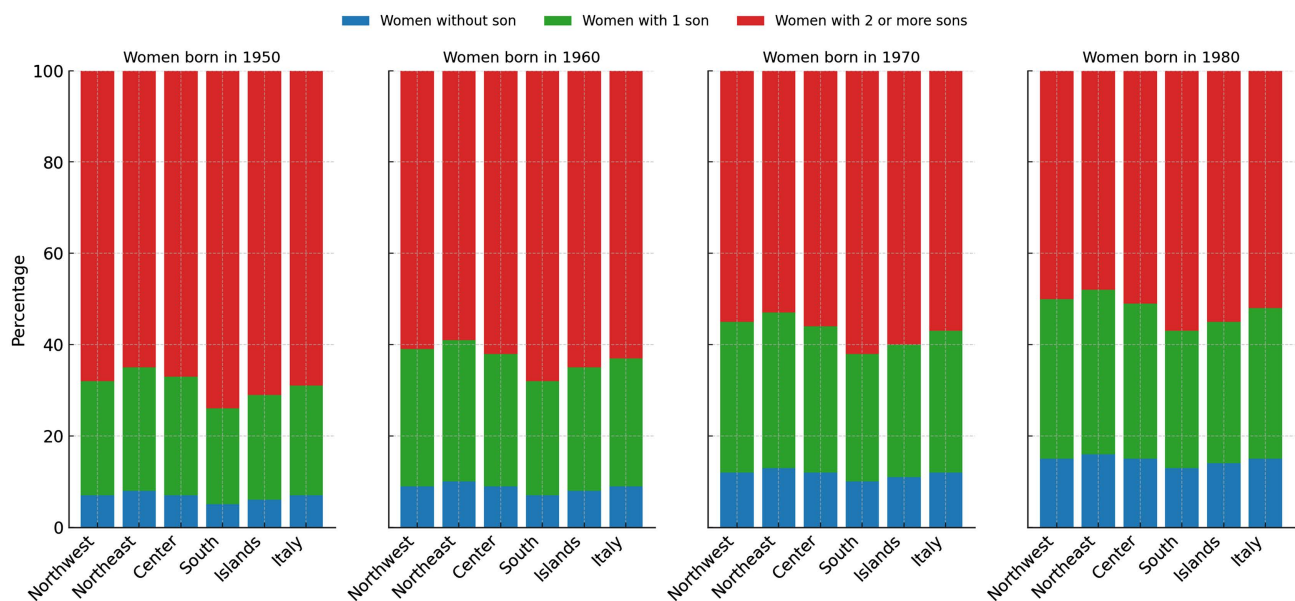
The data available to us indicate that, in 2020, women aged 15 to 49 in Italy had an average of 1.24 children (1.27 in 2019), accentuating the decline since 2010, when the relative maximum of 1.44 was recorded. These fertility levels appear to be the lowest since the early 2000s.

When aiming to stratify fertility levels among women residing in Italy based on their regions, contrary to common beliefs, the North confirms the lead in the highest fertility levels for the total residents, especially in the Autonomous Provinces of Bolzano and Trento, Veneto, and Lombardy. This trend is reversed in the Central and Southern regions of Italy, where fertility levels have slightly declined compared to the same months of the previous year. However, the negative record is held by Sardinia, which continues to present the lowest fertility level among residents in the national territory—a value that is further decreasing compared to 2019.

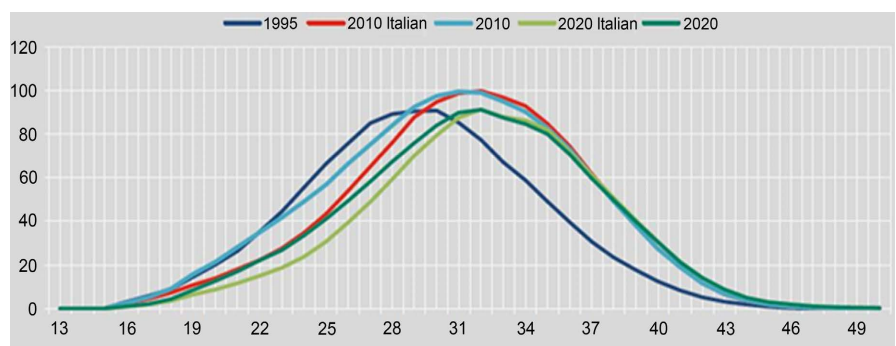
Regional differences in total fertility are a direct consequence of socio-economic disparities within the national territory. A more flourishing economy and the consequent higher work and well-being expectations in the North, compared to the Central and Southern regions, have encouraged the migration of young families to these areas. However, despite more relaxed life expectations,

during the pandemic, the average number of children per woman residing in Italy decreased equally in both the North (from 1.16 to 1.14) and the South (from 1.23 to 1.21), maintaining almost stable values in the Central region (1.11).

Another undeniable finding from recent studies is that, comparing fertility rates by age in 1995, 2010 (Italian women and total residents), and 2020 (Italian women and total residents), there is a shift in fertility towards increasingly mature ages. Compared to 1995, fertility rates have only increased in age groups above 30, showing a completely reversed trend in younger age groups. Consequently, the current average age for the first conception in Italy is 31.4 years (Figure 2, Figure 3).



**Figure 2.** Women by number of children aged 15 to 49, distribution, and generation (Women born 1950, 1960, 1970, and 1980, percentage composition).



**Figure 3.** Age-specific fertility rates for women resident in Italy (Years 1995, 2010 (only Italian and total), and 2020 (only Italian and total), values for 1000 women).

Delving into a more detailed analysis of the fertility decline stratified by age groups of women residing in Italy, the clear correlation with the SARS-CoV-2 pandemic and its socio-economic consequences becomes apparent. Nationally,

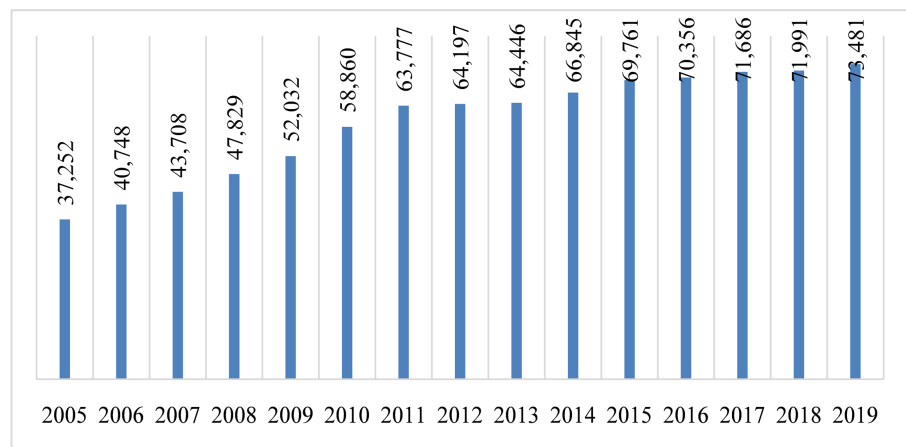
during January-October 2020, the decline in births primarily affected very young women ( $-5.6\%$  for women up to 24 years old), as previously mentioned. This phenomenon is likely due to the economic uncertainty caused by the pandemic, which disproportionately impacted younger age groups, making them less capable of establishing and supporting a new family. On the contrary, women aged over 30, likely with more stable economic foundations, perceived a less unfavorable period for procreation and partly compensated for this negative trend in birth rates.

Another alarming finding is evident when considering the fertility rate in women over 45 years old. The data showed a marked contraction starting from November 2020. The likely explanation for this phenomenon lies in the reduced use of Assisted Reproductive Technology (ART), which peaked during the lockdown months. This conception technique is more prevalent among women aged 40 and above, particularly through assisted fertilization with egg donation.

From the presented data, it is now clear and indisputable that the dramatic impact of the pandemic on the fertility of the Italian population has only exacerbated an already critical pre-existing condition.

## 1.2. Assisted Reproductive Techniques (ART) in Lazio during the Pandemic

Let's delve into the trends of both homologous and heterologous Assisted Reproductive Techniques (ART) and birth rates in the Lazio region, where our study was conducted. **Figure 4** illustrates the increase in ART procedures over the years, displaying a consistently rising trend that, from 2005 to 2019, has not shown any deviations (**Figure 4**) [6].



**Figure 4.** Temporal distribution of the results of the cycles started/thawed with all the technologies of II and III level that use couple gametes, in the years 2005-2019.

This data aligns with the information presented thus far. According to ministry data from 2018, Lazio held the third position (after Lombardy and Tuscany) for the number of initiated cycles and the second position (after Campania) for the number of centers (**Table 1**). Of the initiated cycles, 1,109 were in public centers

and 3533 in private ones. Lazio ranks second in the number of cycles using gamete donation. This data has notably increased after the introduction of heterologous fertilization at the San Filippo Neri PMA Center in Lazio.

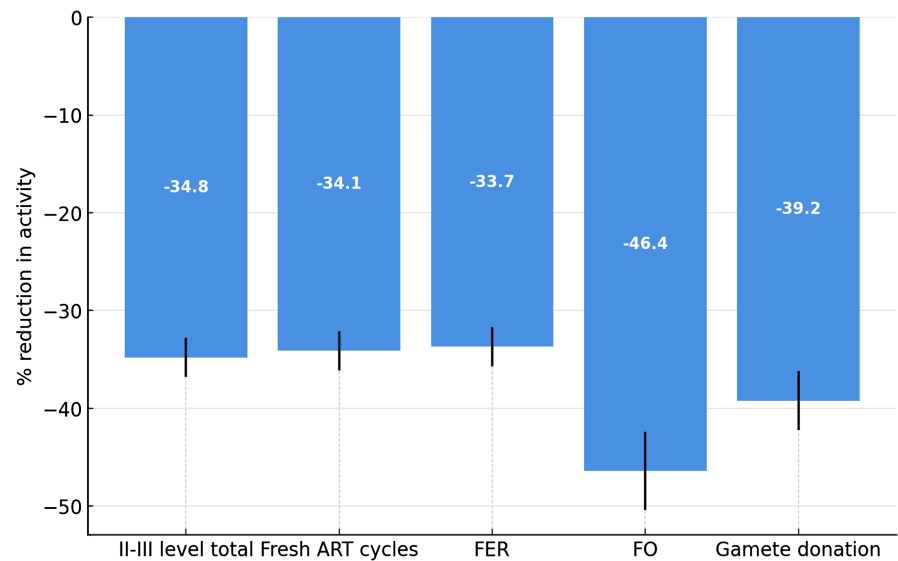
**Table 1.** Summary of the activity, results, and monitoring of pregnancies (years 2014-2019) in the Lazio region.

	2014	2015	2016	2017	2018	2019	Italy 2019
Active centers required to send data	50	42	38	42	42	36	346
% centers that provided data to the ISS	100	100	100	100	100	100	100
All techniques (IUI, IVF, ICSI, thawing embryos and oocytes, donations with male and female gametes)							
N° of treated couples	7162	7190	7938	8126	7823	8320	78,618
N° of cycles started	8574	9134	9684	9580	9366	9149	99,062
N° of born alive	1128	1131	1245	1231	1244	1137	14,162
Level I techniques: Simple Insemination (IUI) and donations							
N° of treated couples	1385	1308	1232	1029	1017	912	10,985
N° of cycles started	1801	1578	1430	1187	1008	873	10,469
N° of pregnancies achieved	197	146	168	104	75	98	1767
% of pregnancies on cycles	10.9	9.3	11.7	8.8	7.4	11.2	16.9
% of lost pregnancies to follow up	29.9	37.6	23.9	30.8	20.6	22.4	22.8
N° of deliveries	139	91	124	72	60	76	1365
N° of born alive	110	82	100	49	73	62	1365
All the level II and III techniques (wet techniques, embryo thawing and oocyte thawing techniques, donations)							
N° of treated couples	5777	5882	6706	7097	6806	7408	67,363
N° of cycles started	6773	7556	8254	8393	8358	8276	88,593
N° of pregnancies achieved	1388	1502	1532	1620	1693	1631	16,061
% of lost pregnancies to follow up	20.4	23	24.1	21	21.3	19.2	21
N° of deliveries	828	911	1037	1075	1062	1061	11,754
N° of born alive	915	1029	1157	1182	1171	1076	12,797

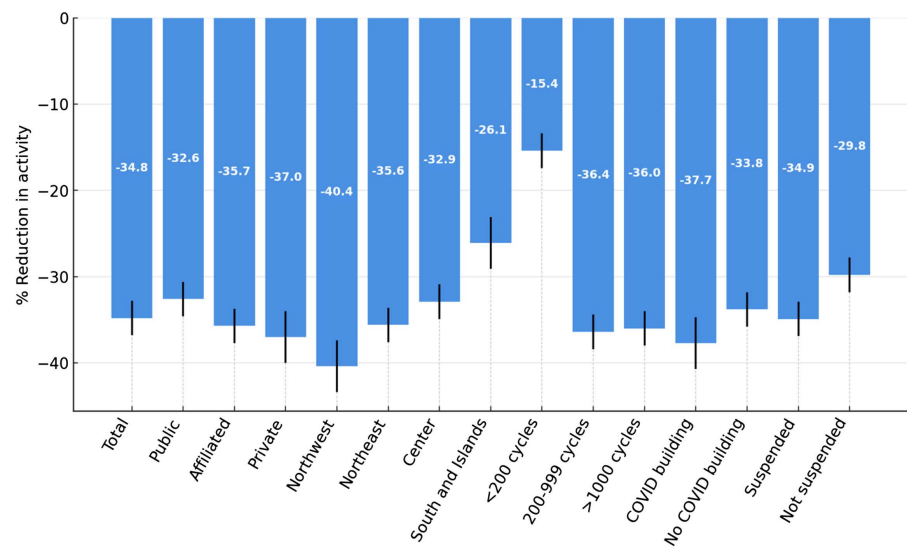
An interesting aspect is the survey conducted by the National Institute of Health aimed at public and private centers in Italy to assess the reduction in activity during the pandemic.

In general, about 9500 fewer ART cycles were observed in the first quarter of

2020 compared to the same period in 2019, representing a 34.8% reduction in activity. Specifically, for In Vitro Fertilization (IVF), there is a 46.4% reduction in cycles, a 34.1% reduction for fresh ART cycles, a 33.7% reduction for Frozen Embryo Transfer (FER), and a 39.2% reduction for cycles involving gamete donation (Figure 5; Figure 6).



**Figure 5.** Percentage reduction of ART cycles according to the applied technique (January-April 2019/2020).



**Figure 6.** Percentage reduction of ART cycles in the first quarter 2020 compared to the first quarter 2019, according to the center characteristics.

### 1.3. Costs of ART Procedures in the Lazio Region

In February 2016, the Lazio Region adopted the costs of the public service established by the Conference of State-Regions-Autonomous Provinces (DCA 19/2016) for homologous fertilization (Tables 2-4).

**Table 2.** Homologous ART, I-level technique: performance profiles and cost sharing.

Code	Description	Unit Cost	Quantity	Analytical Total Cost	Branch Code	Tariff per Prescription	Prescriptions Needed	Prescription Fee + NHS Contribution	Patient Cost Sharing	Total Cost
89.26	Counseling + visit	20.66	2	41.32	37	36.15	1	14.00	14.00	41.32
94.09	Psychological consultation	19.37	1	19.37	40	19.37	1	14.00	14.00	19.37
88.71.1	Ovarian ultrasound (x7)	22.89	7	160.26	37	36.15	4	56.00	104.26	160.26
90.28.1	Clinical evaluation (x7)	9.11	7	63.77	37	36.15	2	28.00	35.77	63.77
90.81.1	Estradiol (5)	9.11	5	45.55	37	36.15	2	28.00	17.55	45.55
90.81.2	Progesterone (3)	9.13	3	27.39	30	33.07	1	14.00	13.39	27.39
90.81.3	LH (3)	9.13	3	27.39	30	33.07	1	14.00	13.39	27.39
90.81.4	Chronic gonadotropins	11.47	1	11.47	37	36.15	1	14.00	-2.53	11.47
90.29.3	Spermiogram	4.18	1	4.18	40	4.18	1	14.00	-9.82	4.18
90.29.4	Seminal fluid capacitation	15.48	1	15.48	37	36.15	1	14.00	1.48	15.48
69.92	Intrauterine insemination	93.00	1	93.00	37	36.15	3	14.00	57.00	93.00
90.81.1	Final report	12.91	1	12.91	37	36.15	9	14	-1.09	12.91
Total				522.09		378.89	27	238.00	257.40	522.09

**Table 3.** Homologous ART, II-level technique: performance profiles and cost sharing.

Code	Description	Unit Cost	Quantity	Analytical Total Cost	Branch Code	Cost per Prescription	Prescriptions Needed	Prescription Fee + NHS Contribution	Patient Cost Sharing	Total Tariff
89.26	Counseling + visit	20.66	2	41.32	37	36.15	1	14.00	14.00	41.32
94.09	Psychological consultation	19.37	1	19.37	40	19.37	1	14.00	14.00	19.37
88.71.1	Ovarian ultrasound (x7)	22.89	7	160.26	37	36.15	4	56.00	104.26	160.26
90.28.1	Clinical evaluation (x7)	9.11	7	63.77	37	36.15	2	28.00	35.77	63.77
90.81.1	Estradiol (5)	9.11	5	45.55	37	36.15	2	28.00	17.55	45.55
90.81.2	Progesterone (3)	9.13	3	27.39	30	33.07	1	14.00	13.39	27.39
90.81.3	LH (3)	9.13	3	27.39	30	33.07	1	14.00	13.39	27.39
90.81.4	Chronic gonadotropins	11.47	1	11.47	37	36.15	1	14.00	-2.53	11.47

## Continued

90.29.3	Spermiogram	4.18	1	4.18	40	4.18	1	14.00	-9.82	4.18
90.29.4	Seminal fluid capacitation	15.48	1	15.48	37	36.15	1	14.00	1.48	15.48
88.78.1	Transvaginal oocyte retrieval (follicular aspiration)	155.00	1	155.00	37	36.15	5	14.00	95.00	155.00
99.23	Analgesia	45.00	1	45.00	37	36.15	2	14.00	17.00	45.00
90.81.1	Final report	12.91	1	12.91	37	36.15	9	14.00	-1.09	12.91
Total (covered services)				629.09				154	455.91	629.09
69.92.4	Testicular sperm aspiration (TESA)	260.00	1	260.00	37					260.00
69.93.1	IVF (with or without ICSI) + embryo cryopreservation	600.00	1	600.00	37					600.00
69.95.2	Embryo transfer - transvaginal	230.00	1	230.00	37					230.00
Patient's co-payment									500	
Grand total									955.91	1749.15

**Table 4.** Homologous ART, III-level technique: performance profiles and cost sharing.

Code	Description	Unit Cost	Quantity	Analytical Total Tariff	Branch Code	Tariff per Prescription	Prescriptions Needed	Prescription Fee + NHS Contribution	Patient Cost Sharing	Total Cost
89.26	Counseling + visit	20.66	2	41.32	37	36.15	1	14.00	14.00	41.32
94.09	Psychological consultation	19.37	1	19.37	40	19.37	1	14.00	14.00	19.37
88.71.1	Ovarian ultrasound (x7)	22.89	7	160.26	37	36.15	4	56.00	104.26	160.26
90.28.1	Clinical evaluation (x7)	9.11	7	63.77	37	36.15	2	28.00	35.77	63.77
90.81.1	Estradiol (5)	9.11	5	45.55	37	36.15	2	28.00	17.55	45.55
90.81.2	Progesterone (3)	9.13	3	27.39	30	33.07	1	14.00	13.39	27.39
90.81.3	LH (3)	9.13	3	27.39	30	33.07	1	14.00	13.39	27.39
90.81.4	Chronic gonadotropins	11.47	1	11.47	37	36.15	1	14.00	-2.53	11.47
90.29.3	Spermiogram	4.18	1	4.18	40	4.18	1	14.00	-9.82	4.18
90.29.4	Seminal fluid capacitation	15.48	1	15.48	37	36.15	1	14.00	1.48	15.48
88.78.1	Transvaginal oocyte retrieval (follicular aspiration)	105.36	1	105.36	37	36.15	5	14.00	61.36	105.36
99.23	Analgesia	45.00	1	45.00	37	36.15	2	14.00	17.00	45.00
90.81.1	Final report	12.91	1	12.91	37	36.15	9	14.00	-1.09	12.91
Total (covered services)				579.45				154	455.91	579.45

**Continued**

69.92.4	Testicular sperm aspiration (TESA)	260.00	1	260.00	37		260.00
69.93.1	IVF (with or without ICSI) + embryo cryopreservation	600.00	1	600.00	37		600.00
Patient's co-payment							500
Grand total	Hospitalization for embryo transfer (laparoscopy, day surgery)						955.91 1519.15

For heterologous fertilization, the costs proposed by San Filippo Neri—ASL Roma 1 were applied, activating the service on July 27, 2018.

- Heterologous fertilization with donor sperm and intrauterine insemination: €1500 (including €500 for medications).
- Heterologous fertilization with donor sperm *in vitro*: €3500 (including €500 for medications).
- Heterologous fertilization with donor egg: €4000 (including €500 for medications).

Regarding private costs, these vary widely from center to center and depending on the geographical location:

- From €600 to €1500 for first-level homologous fertilization cycles.
- From €3500 to €6000 for second-level homologous fertilization cycles.
- From €6500 to €10,000 for heterologous fertilization.

[Note: Figures are in Euros.]

## 2. Study Objectives

The objective of the study was to assess how the contraction of the average income in Italy during the SARS-CoV-2 pandemic influenced both birth rates and the decision to undergo Assisted Reproductive Techniques (ART) in the Lazio region.

## 3. Materials and Methods

This was an observational, cross-sectional study conducted at the Assisted Reproductive Techniques Center of San Filippo Neri Hospital in Rome, the only hospital in Central and Southern Italy offering gamete donation services in the public system. Couples gave informed consent for clinical data use. Ethical approval was obtained from the Ethical Committee of Asl Roma 1. Results were obtained through an online questionnaire consisting of 20 multiple-choice questions, with participants providing anonymous responses. The questionnaire was administered to 500 patients, and 295 responses were received. Each participant answered the following questions by selecting only one of the possible alternatives:

- Gender
- Age

- Marital status
  - Region of residence
  - City of residence
  - Highest educational attainment
  - Occupational status
  - Job position (if employed)
  - Changes in work conditions due to social distancing measures (multiple responses allowed)
  - Monthly family income in January 2020 (net of taxes and transfers)
  - Impact of the Coronavirus pandemic on monthly family income (net of taxes and transfers)
  - Duration of attempting pregnancy
  - Perception of the cost of ART procedures in public healthcare in their region
  - Perception of the cost of ART procedures in private healthcare in their region
  - How the pandemic influenced their desire for pregnancy
  - How the pandemic influenced the decision to resort to ART
  - Influence of family income on choosing ART procedures
  - Temporary abandonment of ART during COVID
  - If YES, whether economic factors influenced the decision
- Data expressed as percentage.

## 4. Results

### 4.1. Demographic Characteristics of the Population

A total of 295 patients were enrolled with an average age of 37.5 years (minimum age 25, maximum age 47). Of these, 88.5% were women, and 11.5% were men. Among the participants, 60.6% declared themselves married, and the remaining 39.4% were cohabiting. About 43.2% of participants had achieved an education level beyond high school (bachelor's, master's, postgraduate, or doctorate), while 8.7% had an education level equivalent to or below middle school. Almost all respondents (94.2%) resided in Lazio (84.6% in Rome), with the rest coming from the Puglia and Calabria regions. **Table 5** presents the main demographic characteristics of the selected population.

**Table 5.** Main demographic characteristics of respondents.

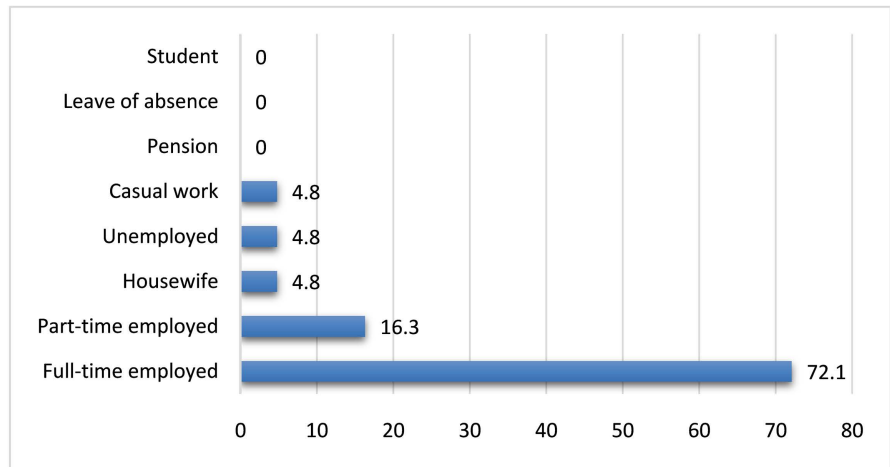
Demographic Characteristics	
Medium age	37.5
Sex %	M: 11.5 F: 88.5
Marital status %	
Married	60.6
Cohabitant	39.4

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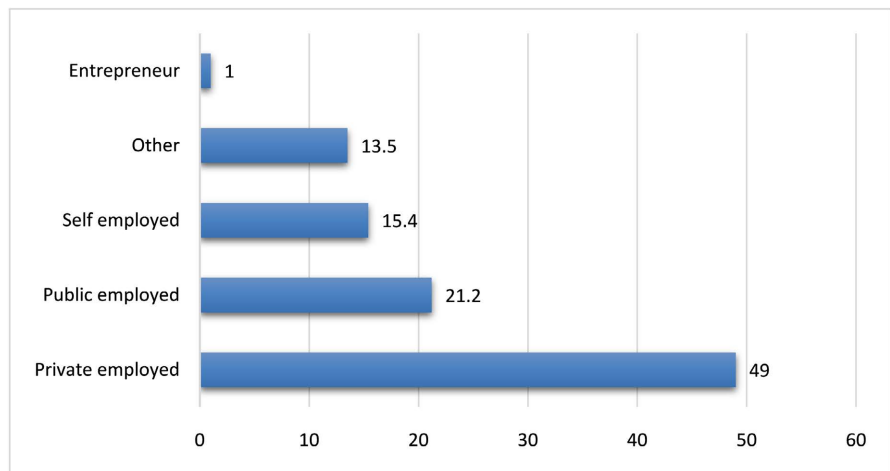
Highest level of education %	
Primary school	0
Middle school	8.7
High school	45.2
Graduation	39.4
PhD	3.8
Other	2.9
Region of residence %	
Lazio	94.2
Calabria	2.9
Puglia	1.9
Abruzzo	1
City of residence %	
Roma	84.6
Latina	4
Pescara	1
Taranto	1
Cosenza	1
Viterbo	3
Brindisi	1
Frosinone	3
Vibo Valentia	1
Reggio Calabria	1
Other	1

**4.2. Job Characteristics of Respondents**

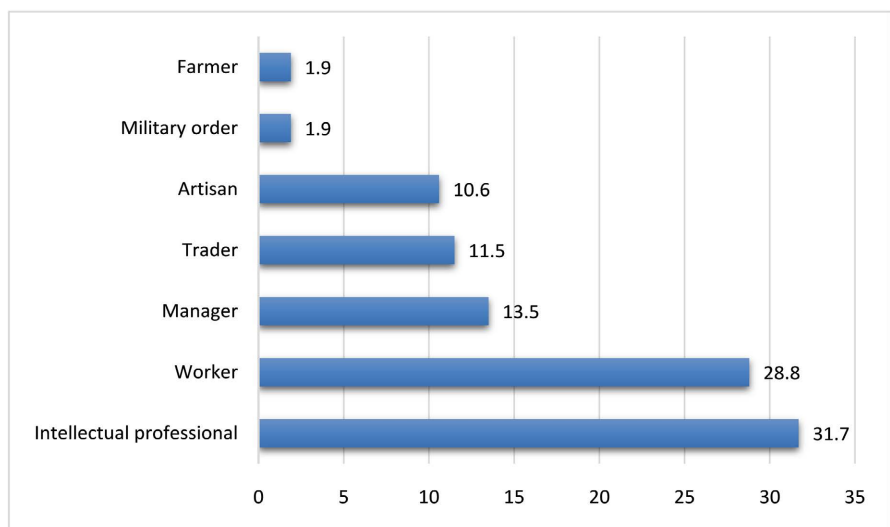
Among respondents, 93.2% reported that they had a monthly income from their work (casual, part-time, and full-time work), the remaining 9.6% identified themselves as unemployed, housewife/girlfriend, or student. **Figures 7-9** represent the working reality of the study participants. Asked about the total family income in January 2020, 9.6% of the participants reported an income of >4000€, 49.1% between 1250 and 4000€, and 11.5% < 1250€ (**Figure 10**). 28.8% of respondents reported that they had not seen any change in income and/or in the way they worked during the pandemic; compared to 12.5% reported an increase in work/earnings, while a further 42,3% said they had worked/earned less or even lost their jobs (**Table 6**).



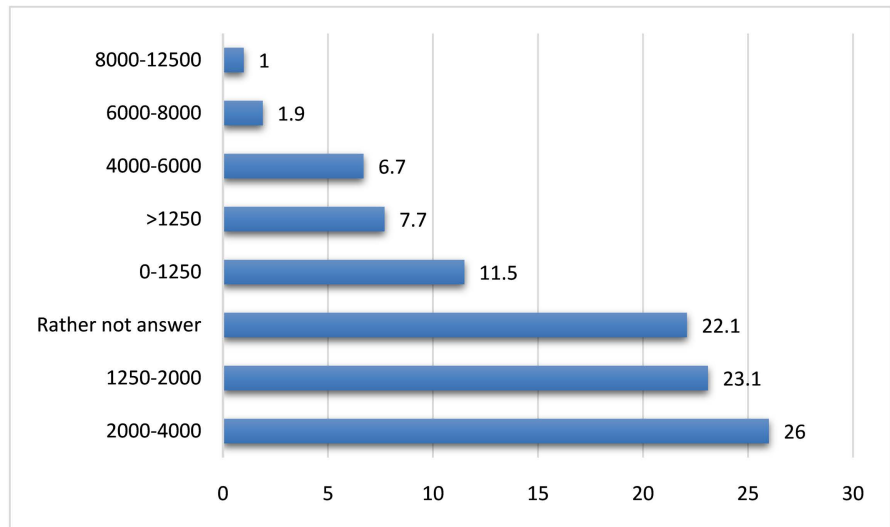
**Figure 7.** Answers obtained to the question “indicate the highest job position held”.



**Figure 8.** Definition of work activity by respondents who declared themselves “employed” in previous questions.



**Figure 9.** Type of position held by the respondents who declared themselves “employed” in the previous.



**Figure 10.** Total family income in January 2020.

**Table 6.** Changes in the amount and manner of work during the pandemic.

Answers to Question	%
Worked Smart Working	31.7%
Not Changed	28.8%
Decreased Work	22.1%
Increased Work	12.5%
Decreased Earnings	11.5%
Equal Earnings	11.5%
Lost Job	8.7%
New Job Opportunities	5.8%

### 4.3. Influence of Pandemic on Use of Medically Assisted Procreation Techniques

Of the total participants in the study, 80.8% were looking for a pregnancy for more than two years, 16.3% for 1-2 years, and the remaining 2.9% for less than a year. The majority of people (82.6%) said they had not seen their desire for offspring reduced since the onset of the health emergency. The willingness to use PMA techniques during the pandemic remained unchanged for 58.7% of respondents, increased for 12.5% and decreased for the remaining 28.8%. The individuals who have declared that they have momentarily renounced the procedures of PMA have been 31.7%, of which 24% admit to having renounced because of the economic factor. **Table 7** shows schematically the answers obtained in the section of the questionnaire concerning the desire to continue treatment for PMA. Asked about the cost of the necessary medical procedures, 62.5% of participants considered the price in public facilities “adequate” and 79.8% called “excessive” the cost in private clinics (**Table 8**).

**Table 7.** Answers to the questionnaire concerning the desire to continue ART treatment during the sanitary emergency.

Motivation to Continue ART Treatment	
How long have you been trying to get pregnant?	%
>2 anni	80.8
1 - 2 anni	16.3
<1 anno	2.9
How did the pandemic affect your desire for pregnancy?	%
Not changed	66.3
Decreased	17.3
Increased	16.3
How did the pandemic affect the choice of ART techniques?	%
Not changed	58.7
Demotivated	28.8
Motivated	12.5
In choosing ART techniques, how much did it affect your family income?	%
Very much	21.2
A lot	38.5
A little	25
Nothing	15.4
During COVID, did you temporarily give up the ART?	%
Yes	31.7
No	68.3
If yes, did the economic side influence your choice?	%
Yes	24
No	76

**Table 8.** Answers to the question: “What do you think about the cost of ART techniques in the private/public sector of your region?”

Respondents' opinions about the cost of ART techniques in their region	Public	Private
Too expensive	37.5%	79.8%
Adequate	62.5%	19.2%
Too cheap	0%	1%

## 5. Final Discussion

Our results highlight how the onset of the pandemic and the consequent economic and social restrictions have affected access to assisted reproductive techniques (ART) and the desire to seek pregnancy. It is evident that in a population where 60% of individuals base their choice of ART on income, the economic constraints resulting from the past two years of the pandemic may have had devastating effects on fertility and the number of births, especially in the advanced maternal age group.

In addition to the economic challenges faced by the participants in our study and the Italian population in general, the impact of the pandemic on the functioning of ART centers must be considered. As previously mentioned in the survey published by the Ministry of Health, the activities conducted within ART centers, both in private and public facilities, experienced a significant slowdown or complete stoppage to make room for COVID wards or other services deemed of primary importance during the initial phases of the pandemic. The survey revealed that approximately 78% of centers suspended all activities without initiating new cycles. Only 3 centers out of 176 reported that they did not completely suspend activities and continued to start new ART treatments.

These findings are consistent with recent international evidence. For instance, a large prospective cohort in China reported a marked decrease in ART utilization after the outbreak of COVID-19, with utilization rates dropping from 6.71% in 2019 to 6.55% in 2020, reflecting the impact of service suspensions and reduced access during the pandemic's early phases [7]. Similarly, an analysis of IVF activity in Jakarta showed an initial decline in cycles during 2020, followed by a progressive recovery between mid-2020 and 2021, when clinics reorganized with safety measures such as negative-pressure operating rooms and systematic testing [8]. Together, these studies support the view that ART activity was strongly conditioned by the health emergency, but once structural and organizational adaptations were introduced, services partially rebounded.

The study and analysis of these data provide a current overview of the conditions of infertile couples in our country, allowing for the implementation of interventions to restore interest and the economic conditions necessary for the initiation of assisted reproductive pathways. Further investigations will be necessary to assess the long-term consequences on the number of pregnancies and newborns once normal conditions are restored at the end of the health emergency.

Finally, the study's findings should be interpreted in light of several limitations. The use of a voluntary online questionnaire resulted in a non-random sample and a moderate response rate (59%), making the study susceptible to self-selection bias. Participants who chose to complete the survey may have been more motivated or affected by the issues being studied than those who did not. Consequently, the sample may not be fully representative of the general population, which threatens the external validity of the results. The findings are therefore most generalizable to the specific group of individuals who were willing to participate and should not be considered representative of the broader population.

## Authors' Contributions

A.P.: conception and design; F.S., E.N., and S.N.: data collection and interpretation; F.S.: wrote the manuscript; A.P.: provided suggestions and revised the manuscript for final submission. All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] Ministry of Labor and Social Policies, National Institute of Statistics—Istat, National Institute of Social Security—INPS, National Institute for Insurance against Accidents at Work—INAIL and National Agency for Active Labor Policies—ANPAL (2021) The Labor Market in 2020. An Integrated Reading. Istat. <https://www.istat.it/it/archivio/253812>
- [2] National Institute of Statistics—Istat (2021) Istat's Statistics on Poverty-Year 2020. Statistical Report. Istat. <https://www.istat.it/it/archivio/258632>
- [3] National Institute of Statistics—Istat (2021) Birth Rate and Fertility of the Resident Population-Year 2020. Statistical Report. Istat. <https://www.istat.it/it/archivio/264643>
- [4] Pacchiarotti, A., Frati, G. and Saccucci, P. (2020) A Surprising Link with Unexplained Infertility: A Possible COVID-19 Paradox? *Journal of Assisted Reproduction and Genetics*, **37**, 2661-2662. <https://doi.org/10.1007/s10815-020-01911-6>
- [5] Ministry of Health (2021) Report of the Minister of Health to Parliament on the Status of Implementation of the Law Containing Rules on Assisted Reproductive Technology (Law of February 19, 2004, NO. 40, Article 15). [https://www.salute.gov.it/portale/documentazione/p6\\_2\\_2\\_1.jsp?lingua=italiano&id=3162](https://www.salute.gov.it/portale/documentazione/p6_2_2_1.jsp?lingua=italiano&id=3162)
- [6] Higher Institute of Health—ISS (2024) Commissioner's Decree of February 4, 2016, n. U00029. Medically Assisted Procreation (MAP). Reception of the Document Approved at the Conference of the Regions and Autonomous Provinces on September 25, 2014 (Prot. n. 14/121/CR7c/C7). Approval of the Performance Profiles for Levels I, II, III, and Cost-Sharing Methods for Homologous MAP. Transitory Discipline. <https://www.iss.it/documents/20126/0/DCA+29+DEL+2016.pdf/cf250221-ec8e-a2f2-00fe-3c4993fb8de8?t=1608115041405>
- [7] Hu, J., Liu, J., Zeng, Q., Zeng, J., et al. (2024) Increased Adverse Pregnancy Outcomes among Decreased Assisted Reproductions during the COVID-19 Pandemic: Insights from a Birth Cohort Study in Southwest China. *BMC Pregnancy Childbirth*, **24**, Article No. 766.
- [8] Azzahra, F., Pangestu, M., Lestari, S.W. and Pratama, G. (2023) Impacts of COVID-19 Pandemic on Three IVF Clinics of Jakarta, Indonesia: A Retrospective Qualitative and Quantitative Study. *International Journal of Fertility and Sterility*, **17**, 254-258.