

What is the Impact of COVID-19 Pandemic Era 2020 on JSSK-JANANI-SHISHU SURAKSHA KARYAKRAM (Mother-Child Protection Program) Services Utilization in India – A Cross-Sectional Comparative Research Study?

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Abstract

Abstract - In India due to the elevated fertility rate and vast population (globally next to china) mother (Janani) and child (Shishu) protection programs (Suraksha Karyakaram) are quite significant for public healthcare provision systems, especially in the ongoing COVID-19 pandemic era during which most of the necessary pregnancy and infant care protective health services utilization are disrupted. The Government of India started JSSK (Janani Shishu Suraksha Karyakaram) on 1st June 2011 for the benefit of millions of pregnant women (PW) and infants utilizing Government (public) health facilities across all the States and UTs (union territories) of India. The Government JSSK scheme provides various free entitlements and services to PW and infants. This may improve maternal and child health services utilization at public health facilities which can reduce MMR (maternal mortality rate) and IMR (infant mortality rate) in the country. The ongoing COVID 19 pandemic era has disrupted several routine health services utilization in India due to lockdowns etc particularly RCH (reproductive and child health) healthcare services which made a situation of rethinking necessary to take necessary steps in the healthcare system's current scenario to prioritize the services according to need and

urgency as well as to construct a robust plan to ensure public health services utilization amidst pandemic or any disasters. This research study was done to provide reference to the scientific community and decision-makers with concrete data analysis from accredited HMIS (Health Management Information system) source (Government of India- MoHFW (Ministry of Health and Family Welfare)) to find out the COVID-19 impact on JSSK services utilization by the PW and sick infants of India attending public healthcare facilities across 36 states and UTs of India. This research study was public health facility-based, retrospective, mixed, cross-sectional study that was conducted for infants and pregnant women who utilized the available free services under JSSK in the public health facilities across 36 states and UTs of India from 1st January 2018 to 31st December 2020. The first COVID-19 patient in India was confirmed on the 27th of January 2020. Hence for this research study, the year before 2020 i.e. 2018, and 2019 were considered as the pre-pandemic period and the year 2020 was considered as the pandemic period. This research study revealed that there is an increase in almost all JSSK service utilization at public health facilities in India compared to the pre-pandemic era on a cumulative all India basis.

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Impact of COVID-19 pandemic era 2020 on JSSK

Public Health / Original Research

1. Abstract - In India due to the elevated fertility rate and vast population (globally next to china) mother (Janani) and child (Shishu) protection programs (Suraksha Karyakaram) are quite significant for public healthcare provision systems, especially in the ongoing COVID-19 pandemic era during which most of the necessary pregnancy and infant care protective health services utilization are disrupted. The Government of India started JSSK (Janani Shishu Suraksha Karyakaram) on 1st June 2011 for the benefit of millions of pregnant women (PW) and infants utilizing Government (public) health facilities across all the States and UTs (union territories) of India. The Government JSSK scheme provides various free entitlements and services to PW and infants. This may improve maternal and child health services utilization at public health facilities which can reduce MMR (maternal mortality rate) and IMR (infant mortality rate) in the country. The ongoing COVID 19 pandemic era has disrupted several routine health services utilization in India due to lockdowns etc particularly RCH (reproductive and child health) healthcare services which made a situation of rethinking necessary to take necessary steps in the healthcare system's current scenario to prioritize the services according to need and urgency as well as to construct a robust plan to ensure public health services utilization amidst pandemic or any disasters. This research study was done to provide reference to the scientific community and decision-makers with concrete data analysis from accredited HMIS (Health Management Information system) source (Government of India-

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Keywords: COVID 19, health services utilization, JSSK (Janani Shishu Suraksha Karyakaram), public health facility,

Introduction

2. Background/rationale

In India due to the elevated fertility rate and vast population (globally next to china) mother (Janani) and child (Shishu) protection programs (Suraksha Karyakaram) are quite significant for public healthcare provision systems, especially in the ongoing COVID-19 pandemic era during which most of the essential pregnancy and infant health services are disrupted [1]. ANC (antenatal care) services for women in India as well as immunization services for children were found to be negatively affected during the ongoing pandemic era which may cause problems to PWs as well as kids who may suffer from VPD (vaccine-preventable diseases) [2]. The Government of India initiated JSSK (Janani Shishu Suraksha Karyakaram) on 1st June, 2011for the benefit of millions of pregnant women (PW) and infants utilizing Government (public) health facilities across all the States and UTs (union territories) of India [3]. Under JSSK pregnant women and sick infants (from 30 days to infants coverage increased in 2014) accessing public government health facilities are entitled to [4]:

1. Free and cashless delivery
2. Free C-Section
3. Free drugs and consumables
4. Free diagnostics
5. Free diet during the stay in the health institutions (3 days during normal delivery and 7 days for C-section)
6. Free provision of blood
7. Exemption from user charges
8. Free transport from home to health institutions

9. Free transport between facilities in case of a referral
10. Free drop back from Institutions to home after 48hrs stay
11. Free treatment
12. In 2014 these entitlements extended to all antenatal & post-natal complications of pregnancy

The Government JSSK scheme providing various free entitlements and services to PW and infants may improve maternal and child health services utilization at public health facilities and reduce MMR (maternal mortality rate) and IMR (infant mortality rate) in the country. The ongoing COVID-19 pandemic has disrupted several routine health services utilization in India due to lockdowns etc, particularly the RCH (reproductive and child health) continuum of care, and a situation of rethinking persist today in the healthcare system's current scenario to prioritize the services according to need and urgency to constitute a robust framework to ensure public health services utilization amidst pandemic or any disasters [5]. Owing to the wide variations among 36 states and UTs of India in the healthcare workforce, state / UTs rankings in the NITI Aayog report, management, equipment, facilities, and geographical locations among various states and UTs; a complex and robust healthcare management framework is much needed to cope with the increasing population during disasters like ongoing COVID-19 [6, 7, 8]. Other Public health services utilization was also reduced in scale due to the impact of COVID-19 as well as the women and children are particularly considered a vulnerable group during disasters and calamities such as COVID-19 and apart from health issues these groups also suffer from violence and mental agony in situations like COVID-19 leading to the family as well as social/national distress [9, 10, 11, 12, and 13]. The pandemic had increased mortality rates in the emergency department of public health facilities during COVID-19 but COVID-19 mortality is low among children and women of reproductive age [14, 15]. Public health management should be customized to state/ UTs -specific scenarios, according to the needs assessment on maternal and child health, and ensuring regular essential health services provisions during the pandemic or any other distress is the real challenge emanating from this situation. This observational study is an attempt to quantify the impact of the corona-pandemic on JSSK in India. This analytical study may help policymakers / decision-makers in making informed decisions. This observational study may provide a reference to the decision-makers and researchers to derive or think about strategies of response to a pandemic or other distress.

3. Objectives

This research study was done to provide reference to the scientific community and decision-makers with concrete data analysis from accredited HMIS (Health Management Information system) source (Government of India- MoHFW (Ministry of Health and Family Welfare)) to find out the COVID-19 impact on JSSK services utilization by the PW of India attending public healthcare facilities across 36 states and UTs of India [16]. The researcher hopes that the findings of this cross-sectional observational research study will help important stakeholders and policymakers in framing strategies for the prioritization of pregnancy healthcare services during the ongoing COVID-19 and even after the pandemic period.

Materials and Methods

4. Study design and period

India is the second-most populous country in the world with a Fertility rate (births per woman) of 2.2 in 2020 which were 5.9 in 1960 [17]. This cross-sectional observational research study was conducted in India across all public health facilities of all the 36 states and union territories of India from January 2018 to December 2020.

A public health facility-based retrospective mixed cross-sectional study was conducted for infants and pregnant women who utilized the available free services under JSSK in the public health facilities across 36 states and UTs of India from 1st January 2018 to 31st December 2020. The first COVID-19 case in India was identified on the 27th of January 2020[18]. Hence for this research study, the year before 2020 i.e. 2018, and 2019 were considered as the pre-pandemic period and the year 2020 was considered as the pandemic period. The JSSK health services utilized were compared during the covid-19 pandemic period i.e.2020 with 2018 and 2019 the pre-pandemic era. The most important confounders were taken into account as per data availability and results were calculated for JSSK health services utilization in the pandemic era which was compared with the pre-pandemic era to assess the impact of COVID-19 on JSSK free health services utilization.

5. Setting

This cross-sectional observational research study was carried out by continuous collection, observation, and analysis of public health facilities data from the HMIS of MoHFW. The populations covered were PW and infants from 36 states and union territories of India who accessed any public health facilities and received/benefitted from JSSK free entitlements. As per the data obtained from HMIS, the total number of pregnant women registered for ANC at public health facilities during the study period were 60547407 numbers of PWs. The financial burden of JSSK free health services in the public/government hospital of India is cost-free, covered partly by state / UTs and central governments.

The JSSK entitles above mentioned free service utilization to all pregnant women delivering in public health institutions only and sick babies and infants up to one year of age accessing public health institutions only for treatment. Hence this research study was done only over the public health facilities of India. Also, we know that the confounder is a variable associated or related to both the variable of interest/study (here it was free health services utilization at public health facilities provided under JSSK) and the outcome of interest. The most important confounders (which can interfere with the outcome) included in this study were

1. Total number of pregnant women registered for ANC at public health facilities
2. Live Birth - Male at public health facilities
3. Live Birth - Female at public health facilities
4. Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities
5. Total C -Section deliveries performed at public health facilities

Here it is also important to state that number 1 above is an independent variable whereas others 2,3,4,5 and services utilized under JSSK are dependent variables in this research study.

6. Participants

The actual participants were all the PWs registered for ANC at public health facilities and PWs as well as infants who utilized JSSK free health services at any public health facilities of choice in India across 36 states and UTs, during the study period of this research study, were considered as the study population. A total of 60547407 numbers of pregnant women and 30706393 institutional deliveries who fulfilled the inclusion criteria were included in this research study.

Ethical Consideration

Ethical approval was not applicable for this research study as we have not done any human or animal trials etc. or involved them in such a way that requires ethical approvals. Added to this, the data utilized is available to the public and

we had not disclosed any hidden or secret data. The purpose of this research study is well explained above, and ethical approval is not applicable for such studies in India based on data available in the public domain. The researcher is a medical doctor working for the government of Bihar, India and this research study is a part of the author's independent self-financed research works.

Sample Size and Sampling Technique

A total of 60547407 numbers of PWs and 30706393 institutional deliveries registered at public health facilities only in India across different states and UTs were included in this research study with a purposive sampling technique. The data required for this study purpose were collected from HMIS of the MoHFW which is the only available most accredited data source in India. The total number of variables/indicators including confounders and those derived from available data for the study were fifteen (15). The data were collected and analyzed with the help of Microsoft office and stata15.1 software. Live male and female birth variables were kept under section other analyses.

7. Variables

Study Variables and Operational Definition

The outcome variables for this research study were JSSK health care free services utilization by any PWs and infants across 36 states and UTs of India during the study period. JSSK health care free services utilization for this study was defined as follows:

1. Total number of pregnant women registered for ANC at public health facilities (registration of ANC is a free service and included in the research study to reduce bias as well as potential confounders recognized during the research study)
2. Number of Pregnant Women provided - Free Medicines under JSSK
3. Number of Pregnant Women provided - Free Diet under JSSK
4. Number of Pregnant Women provided - Free Diagnostics under JSSK
5. Number of Pregnant Women provided - Free Home to facility transport under JSSK
6. Number of Pregnant Women provided - Interfacility transfers when needed under JSSK
7. Number of Pregnant Women provided - Free Drop Back home under JSSK
8. Number of sick infants provided - Free Medicines under JSSK
9. Number of sick infants provided - Free Diagnostics under JSSK
10. Number of sick infants provided - Free Home to facility transport under JSSK
11. Number of sick infants provided - Interfacility transfers when needed under JSSK
12. Number of sick infants provided - Free Drop Back home under JSSK
13. Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities (institutional deliveries conducted at public health facilities is a free service and included in the research study to reduce bias as well as potential confounder recognized during the research study)
14. Total C -Section deliveries performed at public health facilities
15. Total C -Section deliveries performed per 1000 institutional deliveries at public health facilities (C -Section deliveries / 1000 performed at public health facilities is a free service and included in the research study to reduce bias as well as potential confounders recognized during the research study)

8. Data sources/measurement

Data Collection and Quality Assurance

Fifteen (15) variable/indicator data from HMIS registered health services utilization under the umbrella of JSSK of the Government of India providing free maternal and child healthcare services were selected purposively (sampling) to find out the impact of COVID-19 pandemic on JSSK free health services utilization across public health facilities in 36 states and UTs of India and were continuously collected, observed-analyzed using Microsoft office and stata15.1 software from electronic records of HMIS-MoHFW. The data were checked for specificity, measurability, accuracy, reliability, completeness, and consistency.

Data Management and Analysis

The data obtained were checked for any inconsistencies, missing values, incompleteness, etc then collected into Microsoft office software and further exported to STATA15.1 for further analysis. Data collection was done with Microsoft office from HMIS-Government of India and ethical approval is not required for such research studies based on government data in the public domain. Data related to JSSK healthcare services and for possible confounders were obtained from HMIS for the pandemic period 2020 and compared with pre-pandemic data for the same period years 2019 and 2018. The data entered into a Microsoft Excel spreadsheet were also analyzed using Stata software version 15.1.

Data Availability

The data source for this research study is available on HMIS MoHFW, Government of India. The link to the source is: - <https://hmis.nhp.gov.in/#/standardReports>

9. Bias and Confounders

During the research study period, the researcher found that comparing exclusively the JSSK free services utilization may be a biased study. Hence the researcher included some variables and two pre-pandemic year data to reduce the bias as well as to take care of potential confounders. These variables were as follows:

1. Total number of pregnant women registered for ANC at public health facilities (registration of ANC is a free service and included in the research study to reduce bias as well as potential confounders recognized during the research study)
2. Number of sick infants provided - Free Drop Back home under JSSK
3. Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities (institutional deliveries conducted at public health facilities is a free service and included in the research study to reduce bias as well as potential confounder recognized during the research study)
4. Total C -Section deliveries performed at public health facilities
5. Total C -Section deliveries performed per 1000 institutional deliveries at public health facilities (C -Section deliveries / 1000 performed at public health facilities is a free service and included in the research study to reduce bias as well as potential confounders recognized during the research study)

10. Study size

The purposive sampling technique was utilized to get the answer for this research study title mentioned research question. A total of 60547407 numbers of PWs and 30706393 institutional deliveries registered at public health facilities only during the study period were included in this study as explained above.

11. Quantitative variables

The quantitative variables were purposively chosen to get the answer to the research question. See Table-1 which lists all the purposively selected variables.

Table-1- List of variables for this research study

Total number of pregnant women registered for ANC at public health facilities
Number of Pregnant Women provided - Free Medicines under JSSK
Number of Pregnant Women provided - Free Diet under JSSK
Number of Pregnant Women provided - Free Diagnostics under JSSK
Number of Pregnant Women provided - Free Home to facility transport under JSSK
Number of Pregnant Women provided - Interfacility transfers when needed under JSSK
Number of Pregnant Women provided - Free Drop Back home under JSSK
Number of sick infants provided - Free Medicines under JSSK
Number of sick infants provided - Free Diagnostics under JSSK
Number of sick infants provided - Free Home to facility transport under JSSK
Number of sick infants provided - Interfacility transfers when needed under JSSK
Number of sick infants provided - Free Drop Back home under JSSK
Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities
Total C -Section deliveries performed at public health facilities
Total C -Section deliveries performed per 1000 institutional deliveries at public health facilities
Other analyses variables
Total Live Birth at public health facilities
Live Birth - Male at public health facilities
Live Birth - Female at public health facilities

12. Statistical methods

The annual prevalence for all the free healthcare services utilization at public health facilities in India provided under the JSSK scheme was calculated from the data of all the 36 states and UTs for the study period. For controlling the confounders annual prevalence per 1000 JSSK free healthcare services utilization was calculated for comparison. Growth or declines in numbers/percentage were compared from the previous year and it was also calculated to assess the trends of JSSK free services utilization during the study period.

13. Participants

A total number of 20467393, 20789929, and 19290085 PWs registered at public health facilities of India across 36 states and UTs and listed on HMIS of MoHFW (Government of India) were included in this research study during the years 2018, 2019, and 2020 respectively. Similarly, other participants were selected keeping intact the key eligibility of free healthcare services utilization under JSSK at public health facilities located in any state / UTs of India during the study period. Table - 2 shows the number of eligible participants at each stage of this research study.

Table-2- Number of eligible participants during 2018-2019-2020

Indicator	Total 2018	Total 2019	Total 2020
Total number of pregnant women registered for ANC at public health facilities	20467393	20789929	19290085
Number of Pregnant Women provided - Free Medicines under JSSK	9892026	12477364	13923237
Number of Pregnant Women provided - Free Diet under JSSK	6724038	7897742	8143716
Number of Pregnant Women provided - Free Diagnostics under JSSK	10883867	13047226	13570356
Number of Pregnant Women provided - Free Home to facility transport under JSSK	5068731	4755161	5137408
Number of Pregnant Women provided - Interfacility transfers when needed under JSSK	826016	941306	1104539
Number of Pregnant Women provided - Free Drop Back home under JSSK	4039457	4840247	5044712
Number of sick infants provided - Free Medicines under JSSK	1970113	2284127	2266045
Number of sick infants provided - Free Diagnostics under JSSK	1445638	1906050	1875769
Number of sick infants provided - Free Home to facility transport under JSSK	327287	472707	559696
Number of sick infants provided - Interfacility transfers when needed under JSSK	154258	218437	259447
Number of sick infants provided - Free Drop Back home under JSSK	488498	648149	752506
Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities	10378250	10532761	9795382
Total C -Section deliveries performed at public health facilities	1436671	1480223	1367163
Total C -Section deliveries performed per 1000 institutional deliveries at public health facilities (outcome data)	138.43	140.54	139.57

14. Descriptive data

A public health facility-based utilization of free services under JSSK of the Government of India; retrospective mixed cross-sectional study was carried out from 1st January 2018 to 31st December 2020, for pregnant women attending all public healthcare services in 36 states and UTs of India. In this study, a total of 60547407 numbers of PWs and 30706393 institutional deliveries registered at public health facilities were included in the study with a purposive sampling technique to assess the impact of COVID-19 on the utilization of JSSK free services. See Table 1, 2.

15. Outcome data

As stated earlier the Microsoft office and stata15.1 software were used for data collection analysis and graphical presentations etc. Before going to the results the outcome data are presented in table-3, 4, and 5 and figures 1, 2, 3, 4, and 5.

Table-3- Comparisons of JSSK healthcare services utilization during 2018-2019-2020

Indicator	Percentage of previous year 2018 numbers during 2019	Percentage of previous year 2019 numbers during 2020	Growth / decline in numbers during 2019 compared to 2018	Growth / decline in numbers during 2020 compared to 2019	Growth / decline in percentage during 2019 compared to 2018	Growth / decline in percentage during 2020 compared to 2019
Total number of pregnant women registered for ANC at public health facilities	101.58	92.79	322536	-1499844	1.58	-7.21
Number of Pregnant Women provided - Free Medicines under JSSK	126.14	111.59	2585338	1445873	26.14	11.59
Number of Pregnant Women provided - Free Diet under JSSK	117.46	103.11	1173704	245974	17.46	3.11
Number of Pregnant Women provided - Free Diagnostics under JSSK	119.88	104.01	2163359	523130	19.88	4.01
Number of Pregnant Women provided - Free Home to facility transport under JSSK	93.81	108.04	-313570	382247	-6.19	8.04
Number of Pregnant Women provided - Interfacility transfers when needed under JSSK	113.96	117.34	115290	163233	13.96	17.34
Number of Pregnant Women provided - Free Drop Back home under JSSK	119.82	104.22	800790	204465	19.82	4.22
Number of sick infants provided - Free Medicines under JSSK	115.94	99.21	314014	-18082	15.94	-0.79
Number of sick infants provided - Free Diagnostics under JSSK	131.85	98.41	460412	-30281	31.85	-1.59
Number of sick infants provided - Free Home to facility transport under JSSK	144.43	118.40	145420	86989	44.43	18.40
Number of sick infants provided - Interfacility transfers when needed under JSSK	141.60	118.77	64179	41010	41.60	18.77
Number of sick infants provided - Free Drop Back home under JSSK	132.68	116.10	159651	104357	32.68	16.10
Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities	101.49	93.00	154511	-737379	1.49	-7.00
Total C -Section deliveries performed at public health facilities	103.03	92.36	43552	-113060	3.03	-7.64

Table-4- Comparisons of JSSK healthcare services utilization per 1000 PWs during 2018-2019-2020

Indicator	Utilization of Services per 1000 PW registered for ANC at Public health facilities 2018	Utilization of Services per 1000 PW registered for ANC at Public health facilities 2019	Utilization of Services per 1000 PW registered for ANC at Public health facilities 2020
Number of Pregnant Women provided - Free Medicines under JSSK	483.31	600.16	721.78
Number of Pregnant Women provided - Free Diet under JSSK	328.52	379.88	422.17
Number of Pregnant Women provided - Free Diagnostics under JSSK	531.77	627.57	703.49
Number of Pregnant Women provided - Free Home to facility transport under JSSK	247.65	228.72	266.32
Number of Pregnant Women provided - Interfacility transfers when needed under JSSK	40.36	45.28	57.26
Number of Pregnant Women provided - Free Drop Back home under JSSK	197.36	232.82	261.52

Table-5- Comparisons of JSSK healthcare services utilization per 1000 institutional deliveries during 2018-2019-2020

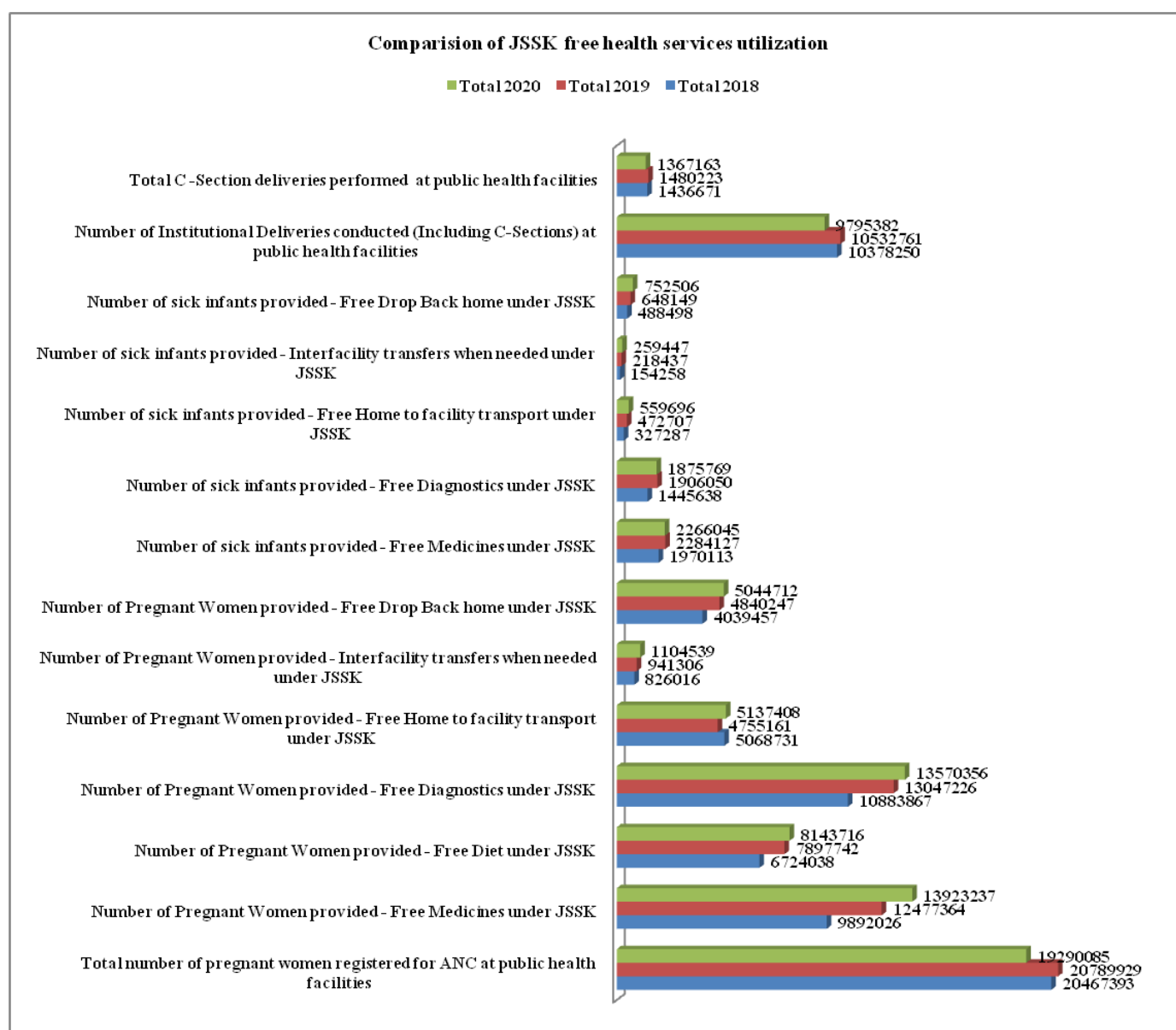
Indicator	Utilization of Services per 1000 institutional deliveries registered at Public health facilities2018	Utilization of Services per 1000 institutional deliveries registered at Public health facilities2019	Utilization of Services per 1000 institutional deliveries registered at Public health facilities2020
Number of sick infants provided - Free Medicines under JSSK	189.83	216.86	231.34
Number of sick infants provided - Free Diagnostics under JSSK	139.29	180.96	191.50
Number of sick infants provided - Free Home to facility transport under JSSK	31.54	44.88	57.14
Number of sick infants provided - Interfacility transfers when needed under JSSK	14.86	20.74	26.49
Number of sick infants provided - Free Drop Back home under JSSK	47.07	61.54	76.82

16. Main results

IMPACT OF COVID-19 ON:

A. Total number of pregnant women registered for ANC at public health facilities - See figure- 1, 2, and table-2, 3

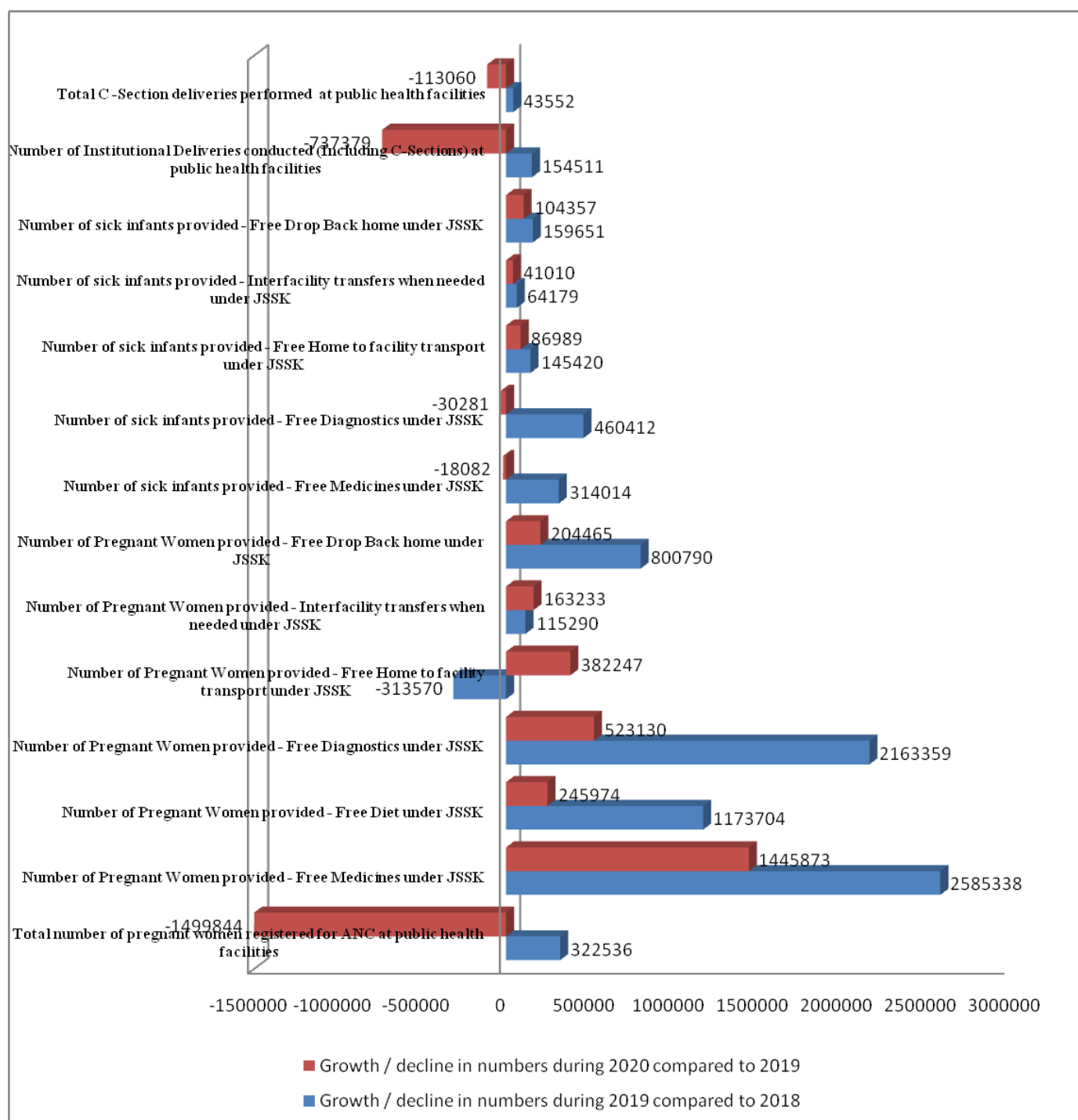
The total number of PWs registered for ANC at public health facilities were 20467393, 20789929, and 19290085 during 2018-2019-2020 respectively which shows a continuous decreasing trend for this indicator during the study period. During 2019 101.58 % of 2018 and during 2020 only 92.79% of 2019 numbers were registered which shows that there is an increase of 322536 numbers of PWs ANC registration in 2019 compared to 2018 followed by a decrease of -1499844 during the COVID-19 era 2020 compared to 2019 expressed as 1.58% increase in 2019 compared to 2018 and -7.21% decrease in 2020 compared to 2019.

Figure-1- Number of free health services utilization Under JSSK during 2018-2019-2020

B. Number of Pregnant Women provided - Free Medicines under JSSK

The total number of PWs provided - Free Medicines under JSSK were 9892026, 12477364, and 13923237 during 2018-2019-2020 respectively which shows a continuously increasing trend for this indicator during the study period. During 2019 126.14 % of 2018 and 2020, 111.59% of 2019 numbers were provided - Free Medicines under JSSK which shows that there is an increase of 2585338 numbers of PWs provided - Free Medicines under JSSK in 2019 compared to 2018 followed by an increase of 1445873 during COVID-19 era 2020 compared to 2019 expressed as 26.14% increase in 2019 compared to 2018 and 11.59% increase in 2020 compared to 2019. The Utilization of this service of free medicines provision under JSSK per 1000 PW registered for ANC at Public health facilities were 483.31, 600.16, and 721.78 during 2018-2019-2020 respectively which shows a continuously increasing trend for this JSSK free healthcare services utilization during the study period. See table-2, 3, 4 and figures 1, 2, and 3.

Figure-2- Comparison of Growth / decline in numbers of JSSK free health services utilization

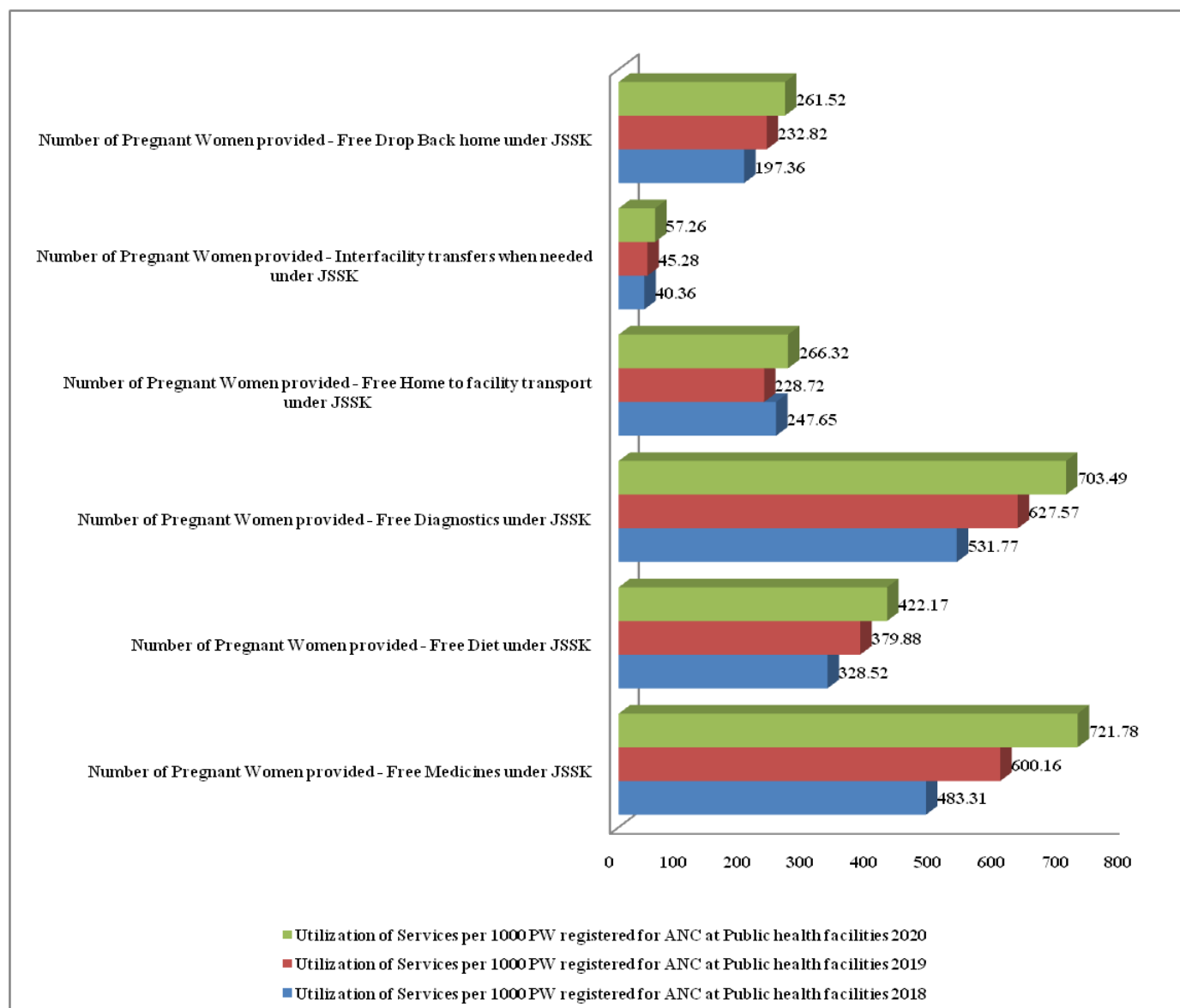


C. Number of Pregnant Women provided - Free Diet under JSSK

The total number of PWs provided - Free Diet under JSSK were 6724038, 7897742, and 8143716 during 2018-2019-2020 respectively which shows a continuously increasing trend for this indicator during the study period. During 2019 117.46 % of 2018 and 2020, only 103.11% of 2019 numbers were provided - Free Diet under JSSK which shows that there is an increase of 1173704 numbers of PWs provided - Free Diet under JSSK in 2019 compared to 2018 followed by an increase of 245974 during COVID-19 era 2020 compared to 2019 expressed as 17.46% increase in 2019 compared to 2018 and 3.11% increase in 2020 compared to 2019. The Utilization of this service of free diet provision under JSSK per 1000 PW registered for ANC at Public health facilities were 328.52, 379.88, and 422.17 during 2018-2019-2020 respectively which shows a continuously increasing trend for this JSSK free healthcare services utilization during the study

period See table-2, 3, 4 and figures 1, 2, and 3.

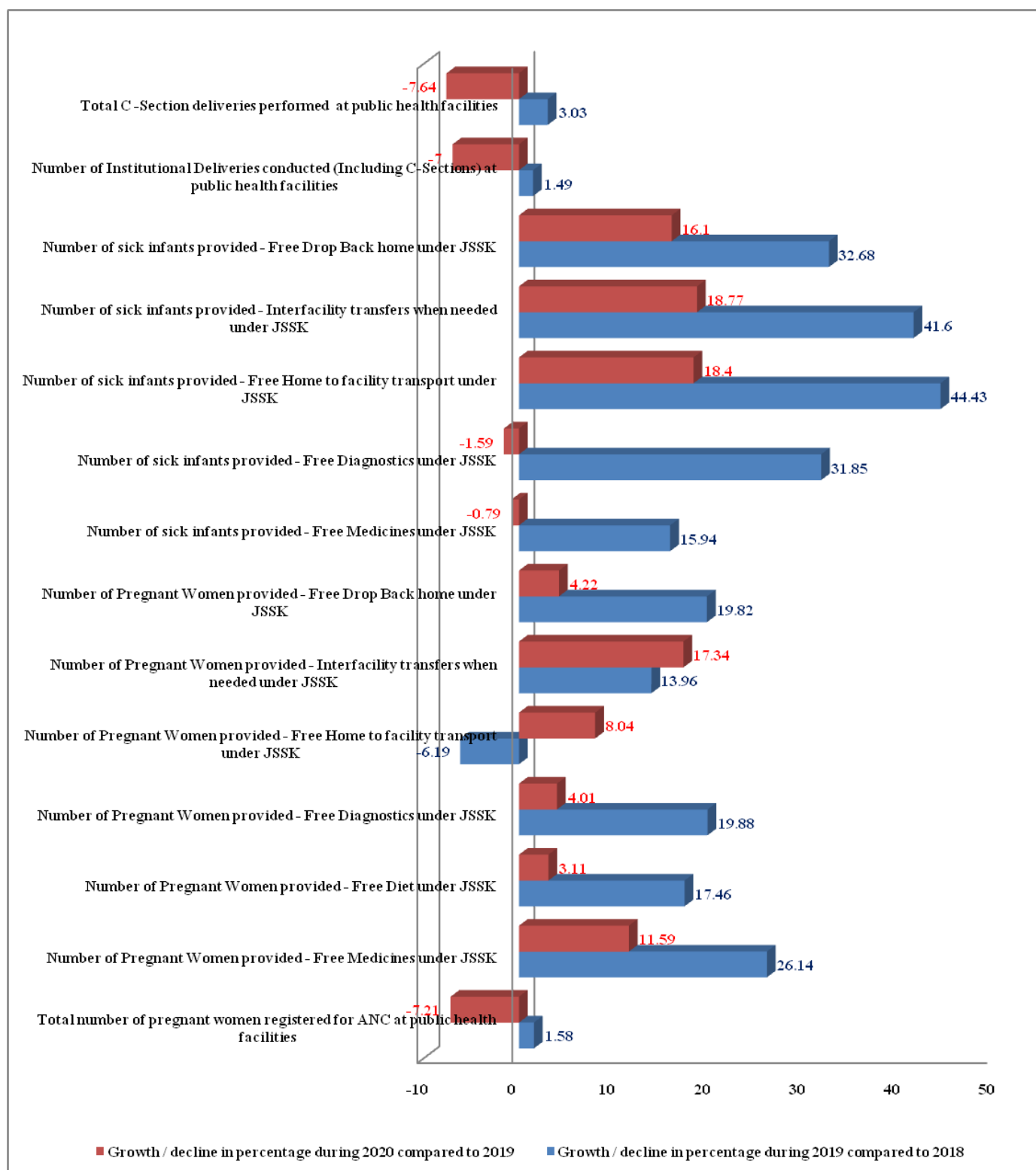
Figure-3- Comparisons of JSSK healthcare services utilization per 1000 PWs during 2018-2019-2020



D. Number of Pregnant Women provided - Free Diagnostics under JSSK

The total number of PWs provided - Free Diagnostics under JSSK were 10883867, 13047226, and 13570356 during 2018-2019-2020 respectively which shows a continuously increasing trend for this indicator during the study period. In 2019 119.88 % of 2018 and 2020, 104.01% of 2019 numbers were provided - Free Diagnostics under JSSK which shows that there is an increase of 2163359 numbers of PWs provided - Free Diagnostics under JSSK in 2019 compared to 2018 followed by an increase of 523130 during COVID-19 era 2020 compared to 2019 expressed as 19.88% increase in 2019 compared to 2018 and 4.01% increase in 2020 compared to 2019. The Utilization of this service of free diagnostics provision under JSSK per 1000 PW registered for ANC at Public health facilities were 531.77, 627.57, and 703.49 during 2018-2019-2020 respectively which shows a continuously increasing trend for this JSSK free healthcare services utilization during the study period See table-2, 3, 4 and figures 1, 2, and 3.

Figure-4- Comparison of Growth / decline in percentage of JSSK free health services utilization



E. Number of Pregnant Women provided - Free Home to facility transport under JSSK

The total number of PWs provided - Free Home to facility transport under JSSK were 5068731, 4755161, and 5137408 during 2018-2019-2020 respectively which shows that after a decrease in 2019 it increased in the 2020 COVID era. In 2019 93.81 % of 2018 and during 2020, 108.04% of 2019 numbers were provided - Free Home to facility transport under JSSK which shows that there is a decrease of -313570 numbers of PWs provided - Free Home to facility transport under

JSSK in 2019 compared to 2018 followed by an increase of 382247 during COVID-19 era 2020 compared to 2019 expressed as -6.19% decrease in 2019 compared to 2018 and 8.04% increase in 2020 compared to 2019. The Utilization of this service of Free Home to facility transport under JSSK per 1000 PW registered for ANC at Public health facilities were 247.65, 228.72, and 266.32 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period. The Utilization of this service of Free Home to facility transport under JSSK increased in the COVID-19 era of 2020 compared to the pre-pandemic era of 2018 and 2019 See table-2, 3, 4 and figures 1, 2, 3, and 4.

F. Number of Pregnant Women provided - Interfacility transfers when needed under JSSK

The total numbers of PWs provided - Interfacility transfers when needed under JSSK were 826016, 941306, and 1104539 during 2018-2019-2020 respectively which shows an increasing trend even in the 2020 COVID era. In 2019 113.96 % of 2018 and during 2020, 117.34% of 2019 numbers were provided - Interfacility transfers when needed under JSSK which shows that there is an increase of 115290 numbers of PWs provided - Free Home to facility transport under JSSK in 2019 compared to 2018 followed by an increase of 163233 during COVID-19 era 2020 compared to 2019 expressed as 13.96% increase in 2019 compared to 2018 and 17.34% increase in 2020 compared to 2019. The Utilization of this service of Interfacility transfers, when needed under JSSK per 1000 PW, registered for ANC at Public health facilities were 40.36, 45.28, and 57.26 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4 and figures 1, 2, 3, and 4.

G. Number of Pregnant Women provided - Free Drop Back home under JSSK

The total numbers of PWs provided - Free Drop Back home under JSSK were 4039457, 4840247, and 5044712 during 2018-2019-2020 respectively which shows an increasing trend even in the 2020 COVID era. In 2019 119.82 % of 2018 and during 2020, 104.22% of 2019 numbers were provided - Free Drop Back home under JSSK which shows that there is an increase of 800790 numbers of PWs provided - Free Drop Back home under JSSK in 2019 compared to 2018 followed by an increase of 204465 during COVID-19 era 2020 compared to 2019 expressed as 19.82% increase in 2019 compared to 2018 and 04.22% increase in 2020 compared to 2019. The Utilization of this service of Free Drop Back home under JSSK per 1000 PW registered for ANC at Public health facilities were 197.36, 232.82, and 261.52 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4 and figures 1, 2, 3, and 4.

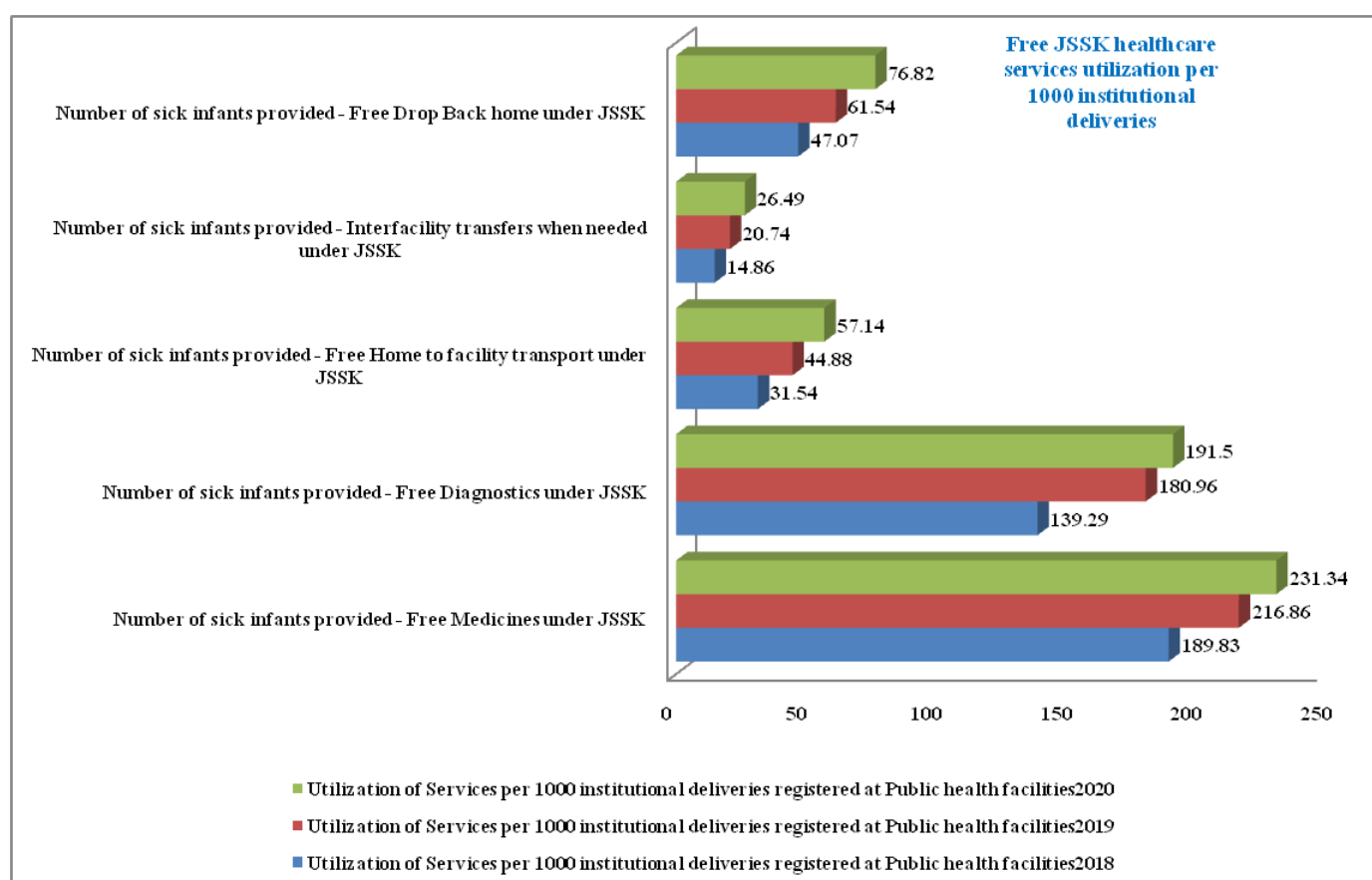
H. Number of sick infants provided - Free Medicines under JSSK

The total numbers of sick infants provided - Free Medicines under JSSK were 1970113, 2284127, and 2266045 during 2018-2019-2020 respectively which shows an increase in 2019 followed by a little decrease in the 2020 COVID era. In 2019 115.94 % of 2018 and 2020, 99.21% of 2019 numbers sick infants provided - Free Medicines under JSSK which shows that there is an increase of 314014 numbers of sick infants provided - Free Medicines under JSSK in 2019 compared to 2018 followed by a decrease of -18082 during COVID-19 era 2020 compared to 2019 expressed as 15.94% increase in 2019 compared to 2018 and -0.79% decrease in 2020 compared to 2019. The Utilization of this service of Free Medicines under JSSK per 1000 institutional deliveries at Public health facilities was 189.83, 216.86, and 231.34 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4,5 and figure 5.

I. Number of sick infants provided - Free Diagnostics under JSSK

The total numbers of sick infants provided - with Free Diagnostics under JSSK were 1445638, 1906050, and 1875769 during 2018-2019-2020 respectively which shows an increase in 2019 followed by a little decrease in the 2020 COVID era. In 2019 131.85 % of 2018 and 2020, 98.41% of 2019 numbers sick infants provided - Free Diagnostics under JSSK which shows that there is an increase of 460412 numbers of sick infants provided - Free Diagnostics under JSSK in 2019 compared to 2018 followed by a decrease of -30281 during COVID-19 era 2020 compared to 2019 expressed as 31.85% increase in 2019 compared to 2018 and -1.59% decrease in 2020 compared to 2019. The Utilization of this service of Free Diagnostics under JSSK per 1000 institutional deliveries at Public health facilities was 139.29, 180.96 and 191.50 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4,5 and figure 5.

Figure-5- Comparisons of JSSK healthcare services utilization per 1000 institutional deliveries during 2018-2019-2020



J. Number of sick infants provided - Free Home to facility transport under JSSK

The total numbers of sick infants provided - Free Home to facility transport under JSSK were 327287, 472707, and 559696 during 2018-2019-2020 respectively which shows an increasing trend in this free service utilization. In 2019 144.43 % of 2018 and 2020, 118.40% of 2019 numbers sick infants provided - Free Home to facility transport under JSSK which shows that there is an increase of 145420 numbers of sick infants provided - Free Home to facility transport under JSSK in 2019 compared to 2018 followed by an increase of 86989 during COVID-19 era 2020 compared to 2019 expressed as 44.43% increase in 2019 compared to 2018 and 18.40% increase in 2020 compared to 2019. The Utilization of this service of Free Home to facility transport under JSSK per 1000 institutional deliveries at Public health

facilities were 31.54, 44.88, and 57.14 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4,5 and figure 5.

K. Number of sick infants provided - Interfacility transfers when needed under JSSK

The total numbers of sick infants provided - Free Interfacility transfers when needed under JSSK were 327287, 472707, and 559696 during 2018-2019-2020 respectively which shows an increasing trend in this free service utilization. In 2019 144.43 % of 2018 and 2020, 118.40% of 2019 numbers sick infants provided - Free Interfacility transfers when needed under JSSK which shows that there is an increase of 145420 numbers of sick infants provided - Interfacility transfers when needed under JSSK in 2019 compared to 2018 followed by an increase of 86989 during COVID-19 era 2020 compared to 2019 expressed as 44.43% increase in 2019 compared to 2018 and 18.40% increase in 2020 compared to 2019. The Utilization of this service of Free Interfacility transfers when needed under JSSK per 1000 institutional deliveries at Public health facilities were 14.86, 20.74, and 26.49 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4,5 and figure 5.

L. Number of sick infants provided - Free Drop Back home under JSSK

The total numbers of sick infants provided - Free Drop Back home under JSSK were 488498, 648149, and 752506 during 2018-2019-2020 respectively which shows an increasing trend in this free service utilization. In 2019 132.68 % of 2018 and 2020, 116.10% of 2019 numbers sick infants provided - Free Drop Back home under JSSK which shows that there is an increase of 159651 numbers of sick infants provided - Free Drop Back home under JSSK in 2019 compared to 2018 followed by an increase of 104357 during COVID-19 era 2020 compared to 2019 expressed as 32.68% increase in 2019 compared to 2018 and 16.10% increase in 2020 compared to 2019. The Utilization of this service of Free Drop Back home under JSSK per 1000 institutional deliveries at Public health facilities were 47.07, 61.54, and 76.82 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period See table-2, 3, 4,5 and figure 5.

M. Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities

The total Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities were 10378250, 10532761, and 9795382 during 2018-2019-2020 respectively which shows an increase followed by a decrease during COVID-19 ERA 2020. During 2019 101.49 % of 2018 and during 2020 only 93.00% of 2019 numbers were registered which shows that there is an increase of 154511 numbers of Institutional Deliveries conducted (Including C-Sections) at public health facilities in 2019 compared to 2018 followed by a decrease of -737379 during COVID-19 era 2020 compared to 2019 expressed as 1.49% increase in 2019 compared to 2018 and -7.00% decrease in 2020 compared to 2019.

N. Total C -Section deliveries performed at public health facilities

The Total C -Section deliveries performed at public health facilities were 1436671, 1480223, and 1367163 during 2018-2019-2020 respectively which shows an increase followed by a decrease during COVID-19 ERA 2020. In 2019 103.03 % of 2018 and 2020, only 92.36% of 2019 numbers were registered which shows that there is an increase of 43552 numbers of C -Section deliveries performed at public health facilities in 2019 compared to 2018 followed by a decrease of -113060 during COVID-19 era 2020 compared to 2019 expressed as 3.03% increase in 2019 compared to 2018 and -7.64% decrease in 2020 compared to 2019. The Total C -Section deliveries performed per 1000 institutional deliveries at public health facilities were 138.43, 140.54, and 139.57 during 2018-2019-2020 respectively for this JSSK free healthcare

services utilization during the study period.

17. Other analyses

Figure-6- Comparison of total live birth and live birth male / female during study period

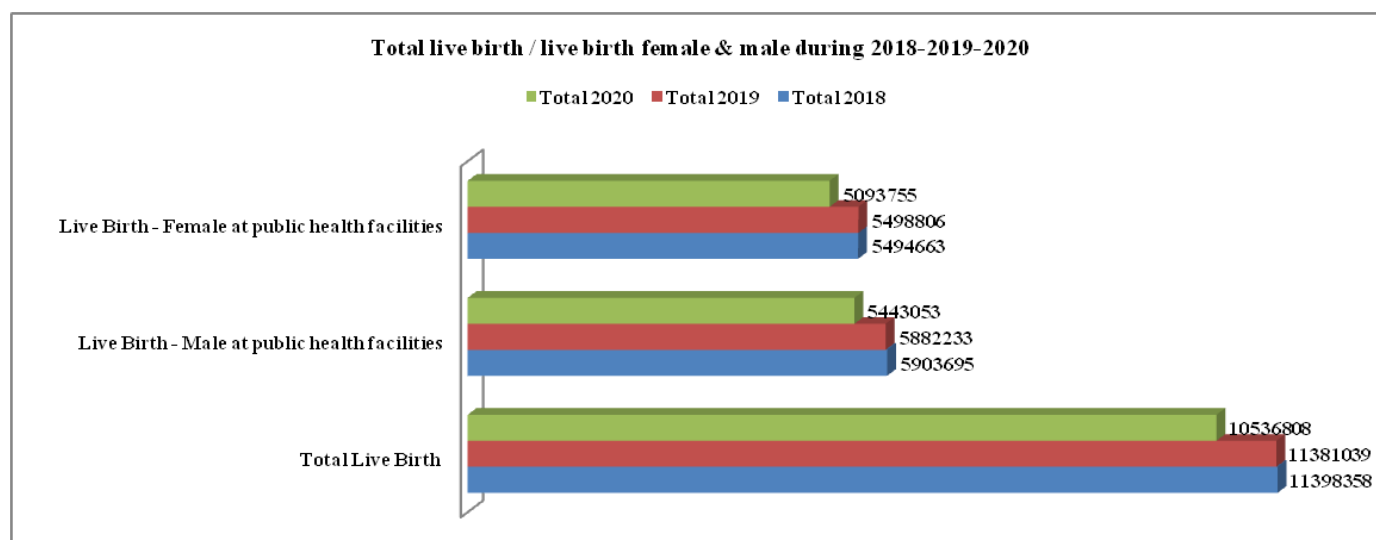


Table-6- Comparison of total live birth and live birth male / female during study period

Indicator	Total Live Birth	Live Birth - Male at public health facilities	Live Birth - Female at public health facilities
2018	11398358	5903695	5494663
2019	11381039	5882233	5498806
2020	10536808	5443053	5093755
Percentage of previous year 2018 numbers during 2019	99.84806	99.64	100.08
Percentage of previous year 2019 numbers during 2020	92.58213	92.53	92.63
Growth / decline in numbers during 2019 compared to 2018	-17319	-21462	4143
Growth / decline in numbers during 2020 compared to 2019	-844231	-439180	-405051
Growth / decline in percentage during 2019 compared to 2018	-0.15194	-0.36	0.08
Growth / decline in percentage during 2020 compared to 2019	-7.41787	-7.47	-7.37

An important observation during this research study is that total live birth, as well as lives of male and female birth at public health facilities, declined during the 2020 Covid-19 era as compared to the pre-pandemic era under study; see table-6 and figure-6. The total live birth reduced by -17319 in 2019 compared to 2018 and -844231 in 2020 compared to 2019 i.e. -0.15% in 2019 and -7.4% in 2020 compared to immediate previous years. The total live birth male reduced by -21462 in 2019 compared to 2018 and -439180 in 2020 compared to 2019 i.e. -0.36% in 2019 and -7.47% in 2020

compared to immediate previous years. The total live birth female increased by 4143 in 2019 compared to 2018 and reduced by -405051 in 2020 compared to 2019 i.e. 0.08% increase in 2019 and -7.37% in 2020 compared to immediate previous years.

18. Key results

- This research study revealed that there is an increase in almost all JSSK service utilization at public health facilities in India compared to the pre-pandemic era on a cumulative all-India basis.
- The total number of PWs registered for ANC at public health facilities were 20467393, 20789929, and 19290085 during 2018-2019-2020 respectively which shows a continuous decreasing trend in the study period, particularly during the COVID-19 era 2020.
- The Utilization of service of free medicines provision by PWs under JSSK per 1000 PW registered for ANC at Public health facilities were 483.31, 600.16, and 721.78 during 2018-2019-2020 respectively which shows a continuously increasing trend for this JSSK free healthcare services utilization during the study period, particularly during COVID-19 era 2020.
- The Utilization of service of free diet provision by PWs under JSSK per 1000 PW registered for ANC at Public health facilities were 328.52, 379.88, and 422.17 during 2018-2019-2020 respectively which shows a continuously increasing trend for this JSSK free healthcare services utilization during the study period, particularly during COVID-19 era 2020.
- The Utilization of service of free diagnostics provision by PWs under JSSK per 1000 PW registered for ANC at Public health facilities were 531.77, 627.57, and 703.49 during 2018-2019-2020 respectively which shows a continuously increasing trend for this JSSK free healthcare services utilization during the study period, particularly during COVID-19 era 2020.
- The Utilization of service of Free Home to facility transport by PWs under JSSK per 1000 PW registered for ANC at Public health facilities were 247.65, 228.72, and 266.32 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period. The Utilization of this service of Free Home to facility transport under JSSK increased in the COVID-19 era of 2020 compared to the pre-pandemic era of 2018 and 2019.
- The Utilization of service of Interfacility transfers, when needed by PWs under JSSK per 1000 PW, registered for ANC at Public health facilities were 40.36, 45.28, and 57.26 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period. The Utilization of this service of Free Interfacility transfers, when needed under JSSK, increased in the COVID-19 era of 2020 compared to the pre-pandemic era of 2018 and 2019.
- The Utilization of service of Free Drop Back home by PWs under JSSK per 1000 PW registered for ANC at Public health facilities were 197.36, 232.82, and 261.52 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period. The Utilization of this service of Free Drop Back home under JSSK increased in the COVID-19 era of 2020 compared to the pre-pandemic era of 2018 and 2019.
- The Utilization of Free Medicines by sick infants under JSSK per 1000 institutional deliveries at Public health facilities were 189.83, 216.86, and 231.34 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period. The Utilization of this service of free medicines under JSSK increased in the COVID-19 era of 2020 compared to the pre-pandemic era of 2018 and 2019.
- The Utilization of service of Free Diagnostics by sick infants under JSSK per 1000 institutional deliveries at Public

health facilities were 139.29, 180.96 and 191.50 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period. The Utilization of this service of free diagnostics under JSSK increased in the COVID-19 era of 2020 compared to the pre-pandemic era of 2018 and 2019.

- The Utilization of service of Free Home to facility transport by sick infants under JSSK per 1000 institutional deliveries at Public health facilities were 31.54, 44.88, and 57.14 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period which shows the utilization of this service increased in COVID-19 era of 2020 compared to pre-pandemic era 2018 and 2019.
- The Utilization of service of Free Interfacility transfers when needed under JSSK by sick infants per 1000 institutional deliveries at Public health facilities were 14.86, 20.74, and 26.49 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period which shows the utilization of this service increased in COVID-19 era of 2020 compared to pre-pandemic era 2018 and 2019.
- The Utilization of service of Free Drop Back home under JSSK by infants per 1000 institutional deliveries at Public health facilities were 47.07, 61.54, and 76.82 during 2018-2019-2020 respectively for this JSSK free healthcare services utilization during the study period which shows the utilization of this service increased in COVID-19 era of 2020 compared to pre-pandemic era 2018 and 2019.
- The total Number of Institutional Deliveries conducted (Including C-Sections) at public health facilities were 10378250, 10532761, and 9795382 during 2018-2019-2020 respectively which shows an increase followed by a decrease during COVID-19 ERA 2020.
- The Total C -Section deliveries performed at public health facilities were 1436671, 1480223, and 1367163 during 2018-2019-2020 respectively which shows an increase followed by a decrease during COVID-19 ERA 2020.

19. Discussion

Janani Shishu Suraksha Karyakaram (JSSK) may reduce out-of-pocket expenses for families of both pregnant women and sick infants and such programs are much needed in LMICs like India where a large proportion of the population are forced to go under the poverty line due to heavy expenses on health issues every year as well as such schemes may also increase institutional deliveries by reducing fear of heavy expense at delivery institutions. Government should expand this scheme to cover private institution deliveries also under this scheme as the public health facilities are not enough alone to cater to the needs of the vast population as well as poor infrastructure, malpractice, and corruption in the government health sector are also important hurdles in achieving the goal of safe motherhood and healthy child [19]. The JSSK scheme of the government is found to be beneficial and quite helpful as well as significant for PWs and sick infants during the COVID-19 pandemic era 2020 evident from the good utilization of various free protective services under this scheme. The research analysis of this study may be helpful to global governments as well as policy and decision-makers to analyze and understand the JSSK scheme for the betterment of maternal and child health by continuous provision of such essential healthcare services in the ongoing COVID-19 era or any other disasters. During 2020 the Government of India had imposed lockdown like other global nation's leading to disruption of several routine healthcare services utilization but the healthcare service utilization provided under JSSK scheme increased significantly despite low PWs registration for ANC and lockdown etc,[20]. This may be due to the robust framework and implementation of JSSK scheme services as well as due to reduced choice to visit private health facilities due to lockdown and COVID-19 impacts leading to closure

and denial by private health facilities which is a matter of further research.

20. Strength and Limitations

Till today 13-06-2022 to the best of the researcher's knowledge, there is no research study done exclusively on the JSSK scheme; exploring the impacts of the COVID-19 era on JSSK health care services utilization at all HMIS registered public health facilities across 36 states and UTs of India by analyzing 15 accredited HMIS time-bound indicators for PWs and sick infants in the country. This novel research study is not available anywhere on a global basis, which assessed the impact of covid-19 on JSSK health services utilization through several processes or output indicators.

21. Conclusion and Recommendations

This cross-sectional research study found that the covid-19 pandemic increased the utilization of various JSSK free health care services among PWs and sick infants in India compared to the pre-pandemic period. Hence the researcher recommends more efforts in other healthcare services utilization, particularly the non-communicable diseases which constitute a major burden of disease in India as well as globally. The framework and implementation mode of JSSK can be considered as an example of the improvement in public health services for enhancing other health services utilization which was disrupted due to COVID-19 [21].

22. Funding

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23. Conflicts of interest- There are no conflicts of interest.

24. Other information

This is the first version of this work and more versions will evolve in future with more information and analysis.

25. Abbreviation

ANC (antenatal care); JSSK (Janani Shishu Suraksha Karyakaram); COVID-19- Coronavirus disease-2019; pregnant women (PW); MMR (maternal mortality rate); IMR (infant mortality rate); UT- union territories; HMIS (Health Management Information system); MoHFW-Ministry of Health and Family Welfare;

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27. Declarations

- This version of paper has not been previously published in any peer reviewed journal and is not currently under consideration by any journal. The document is Microsoft word with English (United States) language & 5001 words excluding reference and declaration etc. (9431words Total including all).
- Ethics approval and consent to participate: Not applicable. This study has not involved any human or animals in real or for experiments. The submitted work does not contain any identifiable patient/participant information.
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