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FROM NFHS DATA: STATUS OF MATERNAL AND CHILD HEALTH IN KARNATAKA

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Abstract

The National Family Health Survey data indicated that there had been an improvement in maternal and child health in Karnataka. The antenatal care (ANC) visits by pregnant women are increased from 68 per cent in 2005-06 to 70.9 per cent in 2019-20. According to NFHS-3(2005-06), 76 per cent of birth took place at health facilities which increased to 97 per cent in NFHS-5 (2019-20). So, institutional delivery is almost universal in the state. Postnatal Care (PNC) visits were also increased from 61.2 per cent in 2005-06 to 87.4 per cent in 2019-20. Full immunisation coverage was 55 per cent during 2005-06, which increased to 62.6 per cent in 2015-16 and further increased to 84.1 in 2019-20. As far as ANC is concerned, it ranges from 93 per cent in Chikkaballapura to 48 per cent in the Bengaluru district. In terms of institutional delivery, it is 80 per cent in Raichur district and 99 per cent in Ramanagara, Mandya and Bangalore rural districts. Postnatal care visits are highest in the Belgaum district (90%) and lowest in the Gulbarga district (41%). Dakshina Kannada has the highest immunisation coverage (77%), whereas Chikmagalur has the lowest (41%). Scheduled Caste (SC) mothers are less likely to receive maternal and health care services. Hindus use maternal and child health services slightly higher than Muslims or Christians. The gender gap in vaccination coverage has been shown to exist in the state of Karnataka. Boys are significantly more likely to receive full immunisation than their female counterparts.

Keywords: antenatal care, institutional delivery, postnatal care, immunisation, vaccination.

1. INTRODUCTION

One of the most important goals of India's Family Welfare Programs has been to promote maternal and child health. As early as the first five-year plan, the government improved maternal and child health services (1951-56). Antenatal care refers to the pregnancy-related health care provided by a doctor or health personnel at the medical facility or home (IIPS & ORC Macro, 2001). The National Family Health Survey collect information from women regarding antenatal care visits. Maternal and Child health services in rural Karnataka are mainly delivered by government-run Primary Health Centres and Sub-Centres (Matthews et al., 2001). Pregnant women and children can seek care from maternity homes, hospitals, and private practitioners, both public and private. This paper focuses on maternal and child health in Karnataka and its districts. The information is primarily based on the National Family Health Survey. Antenatal care (four or more ANC visits), institutional delivery, postnatal care, and full immunisation were chosen as indicators.

2. ANTENATAL CARE (ANC)

Antenatal care refers to pregnancy-related health care provided by the doctor or health personnel. A pregnant woman can receive antenatal care by visiting doctors or health personnel in a medical facility or home. The National Family Health Survey collects information from women regarding antenatal care visits. Figure 1 depicts the Karnataka mothers who had at least four antenatal care visits. Many mothers received antenatal check-ups (4 or more) for their births per the NFHS-4(2015-16). There is an improvement in antenatal care visits by pregnant women as the figure rose from 68 per cent in 2005-06 to 70.9 per cent in 2019-20. When we investigate the rural and urban areas separately, it shows a different picture. In rural areas, the percentage of mothers who had at least four antenatal care visits decreased from NFHS-4 to NFHS-5, albeit by a small margin. In cities, the percentage of mothers who received at least four antenatal care visits decreased from NFHS-3 to NFHS-4, then increased from NFHS-4 to NFHS-5. The figure shows that many pregnant women in Karnataka received antenatal check-ups four times more.

Figure 2 shows four or more ANC visits by Districts of Karnataka, 2015-16. For their most recent birth, 70 per cent of Karnataka mothers received at least four antenatal care visits. As far as the total percentage is concerned, it ranges from 93 per cent in Chikkaballapura to 48 per cent in the Bengaluru district. Davanageri, Hassan, Gurbarga, Mandya, Udupi, Kodagu, Uttara Kannada, Bellary and Bagalkot have 80-89 per cent of antenatal check-ups. Belgaum, Gadag, Chamarajanagar, Kolar, Dharwad, Bengaluru Rural, Simoga, Ramanagara and Tumkur have 71-79 per cent of antenatal care visits. Bidar, Heveri, Dakshina Kannada, Chitradurga, Mysore, Raichur, Bijapur, Yadgiri, Chikmagalur and Koppal have antenatal care visits ranging from 61-69 per cent. Bengaluru district

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has an extremely low proportion of antenatal care visits compared to the other districts. It is the only district in which antenatal care is below 50 per cent. In all the remaining districts, the antenatal care visit is above 60 per cent. Chikkaballapura is the only district where antenatal care visits are above 90 per cent.

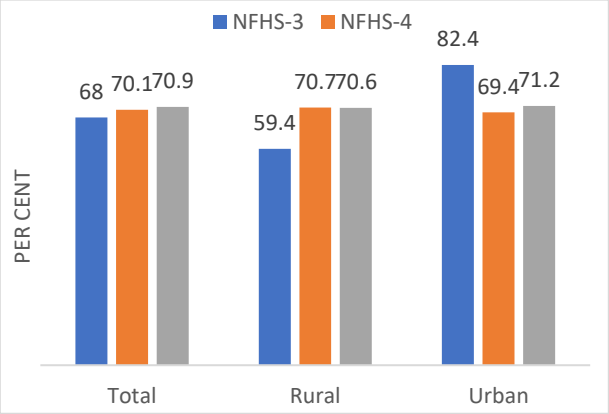

Figure 1 Mothers who had at least four antenatal care visits (%)

***Source**: NFHS-3, 4 & 5*

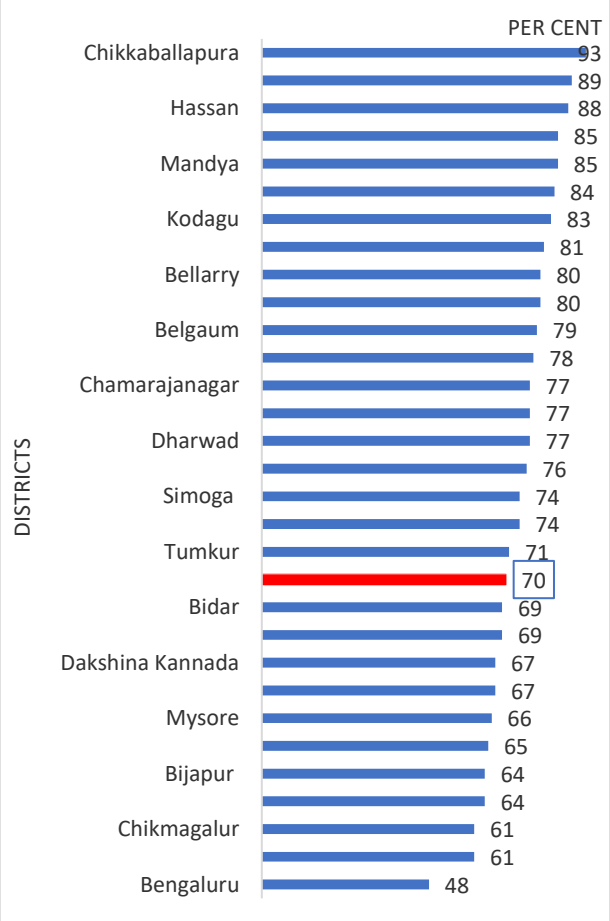

Figure 2 Four or more ANC visits in the districts of Karnataka, 2015-16

***Source**: NFHS-4 (2015-16)*

As far as the rural areas are concerned, the districts with high ANC visits are Chikkaballapura (93.8%), Davanagere (87.1%), Gulbarga (86.8%), Udupi (85.3%), Mandya (84.9 %), Hassan (84.8%), Kodagu (83.3%), Chamarajanagar (82.8%) and Gadag (82.3%) were the district of high percentage. On the other hand, Koppal (59.3%), Raichur (59.6%), Bijapur (60.7%), Chikmagalur (61.3%), Yadgiri (62.8%), Mysore (66.1%), Chitradurga (66.9%), Tumkur (67.1%), Ramanagar (67.9%) and Haveri (69.9%) are the districts which have comparatively low ANC visits. In urban areas, the districts with a high percentage of antenatal care visit include-Ramanagara (94.3%), Udupi (91.7%), Chikkaballapura (90.5%), Davanagere (90.1%) etc. On the other hand, Bangalore (55.4%), Bidar (56.3%), Chamarajanagar (57.7%), Dakshina Kannada (65.5%), Mysore (66.5%), Bangalore rural (66.7%), Chikmagalur (66.7%) etc. have a comparatively lower percentage.

There exists a rural-urban gap in terms of antenatal care visits. In most cases, urban areas have a higher proportion of antenatal care visits than their rural counterparts. However, the following districts have higher urban-rural differences. The percentage is relatively high in urban areas compared to the rural areas in these districts. Except for Bangalore, the urban-rural contrast is heightened in the Ramanagara district, where the difference is 26.4. Koppal (25.3) and Raichur (21.7) have high urban-rural differentials in ANC visits, as shown in the table.

In some districts, rural areas outnumber urban areas by a greater margin. The rural-urban difference is most heightened in Chamarajanagar (25.1) and lowest in Chikkaballapura (3.3). The rural-urban gap is wide in the districts of Bidar (16.4), Bangalore Rural (12.5) and Gadag (10.9).

Table 1 Urban-rural difference in ANC visits by districts of Karnataka, 2015-16

Districts	Rural	Urban	Difference (U-R)
Belgaum	76	88	12
Bagalkot	76.9	85.1	8.2
Bijapur	60.7	76.4	15.7
Bidar	72.7	56.3	-16.4
Raichur	59.6	81.3	21.7
Koppal	59.3	84.6	25.3
Gadag	82.3	71.4	-10.9
Dharwad	79.8	74.3	-5.5
Uttara Kannada	74.1	89.7	15.6
Haveri	69.9	73.5	3.6
Bellary	76.3	86	9.7
Chitradurga	66.9	70.6	3.7
Davanagere	87.1	90.1	3
Shimoga	76	71.2	-4.8
Udupi	85.3	91.7	6.4
Chikmagalur	61.3	66.7	5.4
Tumkur	67.1	82.5	15.4
Bangalore	0	55.4	55.4
Mandya	84.9	80.4	-4.5
Hassan	84.8	89.7	4.9
Dakshina Kannada	70.3	65.5	-4.8
Kodagu	83.3	77.8	-5.5
Mysore	66.1	66.5	0.4
Chamarajanagar	82.8	57.7	-25.1
Gulbarga	86.8	82.2	-4.6
Yadgir	62.8	78.9	16.1
Kolar	75.8	77.1	1.3
Chikkaballapura	93.8	90.5	-3.3
Bangalore Rural	79.2	66.7	-12.5
Ramanagara	67.9	94.3	26.4

***Source**: NFHS-4 (2015-16)*

***Note:** minus (-) sign indicates rural areas have a higher percentage*

Table 2 gives the antenatal care visits by background characteristics. Although rural and urban areas do not

differ much in antenatal care services, rural women have a slightly higher proportion than urban women. Mothers belonging to Scheduled Caste (SC) are less likely to receive antenatal care services. On the other hand, none of them (General) categories are more likely to receive antenatal care services than other castes. Christians and other minority religious groups are less likely to receive antenatal care services. The utilisation of antenatal services is slightly higher for Hindus than for Muslims or Christians. There is a positive association between antenatal care visits and the mother's education. As the educational level of the mother increases, the percentage of antenatal care visits also increases. While 65.3 per cent of mothers with no education visited antenatal care at least four times, the percentage is as high as 77.5 per cent among mothers with higher education. Surprisingly, the percentages of antenatal care visits are the highest among non-working women. It is comparatively lower among women with professional services and sales as an occupation. The wealth index ranges from 68.1 per cent for women living in the low wealth index to 69.6 per cent for women living in the wealthiest wealth index.

Table 2 Antenatal care visits in Karnataka by background characteristics, 2015-16

ANC	%	Frequency	Total
Place of Residence			
Rural	71.3	3240	4543
Urban	69.9	2291	3276
Caste			
ST	71.2	541	760
SC	67.9	1127	1660
OBC	70.8	2604	3678
None of them	85.9	648	754
Don't know	80.9	55	68
Religion			
Hindu	73.1	4514	6176
Muslim	65.1	893	1371
Christian	44.2	107	242
Sikh	100	1	1
Others	56.7	17	30
Education			
No education	65.3	793	1215
Primary	69.4	517	745
Secondary	70.9	3421	4827
Higher	77.5	800	1032
Occupation			
Not working	73.7	699	949
Professional	46.8	29	62
Clerical & sales	57.1	4	7
Household and domestic services	66.2	45	68
Agriculture & Manual	70.6	4745	6721
Don't know	72.7	8	11
Wealth Index			
Poorest	68.1	312	458
Poorer	70.6	1065	1508
Middle	73.4	1604	2185
Richer	73.4	1604	2185
Richest	69.6	1006	1445

***Source**: NFHS-4 (2015-16)*

A study of antenatal care practices at the Primary Health Centre in North Karnataka revealed that antenatal care coverage in the study area was satisfactory. Ninety-three per cent of women received three or more antenatal care visits. Though antenatal coverage was good, women were still reluctant to consume IFA tablets. Early registration also was not up to the standard; nearly 40 per cent of the women registered after 12 weeks of pregnancy (B A et al., 2015). A study in rural areas of North Karnataka shows the early and widespread use of antenatal care. It also reveals that antenatal visits are not scheduled until late pregnancy. Women's literacy has a significant bearing on the utilization of antenatal care by pregnant women. Measures should be adopted for improving female literacy. Care from private sources is considered far superior to that of government services. Iron supplementation compliance was low among anaemic pregnant women. According to a study of manufacturing workers in Bangalore, most received antenatal care delivered in hospitals. In general, antenatal care knowledge was exemplary. Most of the information had come from healthcare providers. The importance of healthcare providers in these factories must be acknowledged, and they must be adequately supported and trained to carry out their responsibilities effectively (B et al., 2005). A study in South Karnataka concluded that antenatal care knowledge was adequate in the study areas but that more knowledge would improve the quality of antenatal care visits. Increased information, education, and communication activities should be increased to raise community awareness of ANC. There is a need to encourage women to freely use maternal care services (Haneef & Shetty, 2015).

3. INSTITUTIONAL DELIVERY

One of the crucial thrusts of the Reproductive and Child Health Programme is to encourage institutional delivery. Figure 2 shows the proportion of births that took place in health facilities. The figure shows that the proportion of institutional deliveries increases over time. For instance, 67 per cent of birth took place at facilities in NFHS-3 and this percentage increases to 97 per cent in NFHS-5. There is an apparent rural-urban gap in institutional births. The institutional delivery in urban areas is higher compared in rural areas. However, the gap is narrowing with time. During 2005-06 the percentage of institutional delivery in rural areas was 56.8, whereas it was as high as 84.8 per cent in urban areas. There was a commendable improvement in institutional delivery in rural areas from 2005-06 to 2015-16. For instance, the percentage of institutional delivery was 56.8 in 2005-06 while 96.2 per cent in 2015-16. This is true for the state too.

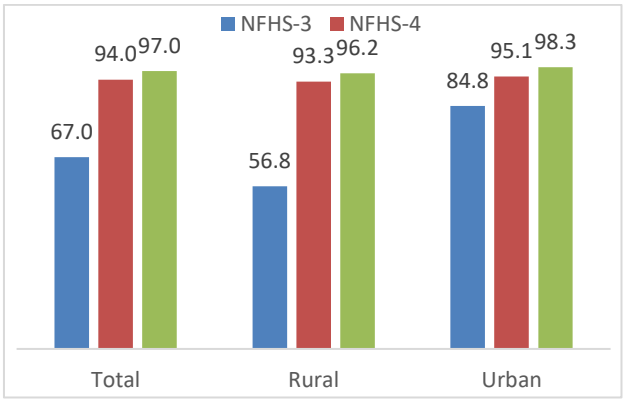

Figure 3 Percentage of Institutional delivery in Karnataka, 2005-06 to 2019-20

***Source**: NFHS-3,4 &5*

The institutional delivery in the districts of Karnataka is quite satisfactory. In Karnataka, 94 per cent of children born in the previous five years of the survey were born in a health facility. As far as the total percentage is concerned, the institutional delivery ranges from 80 per cent in the Raichur district to 99 per cent in Ramanagara, Mandya and Bangalore Rural. Even in the lowest district, it is 80 per cent. Except for the district of Bellary, Koppal and Raichur, the institutional delivery is above 90 per cent.

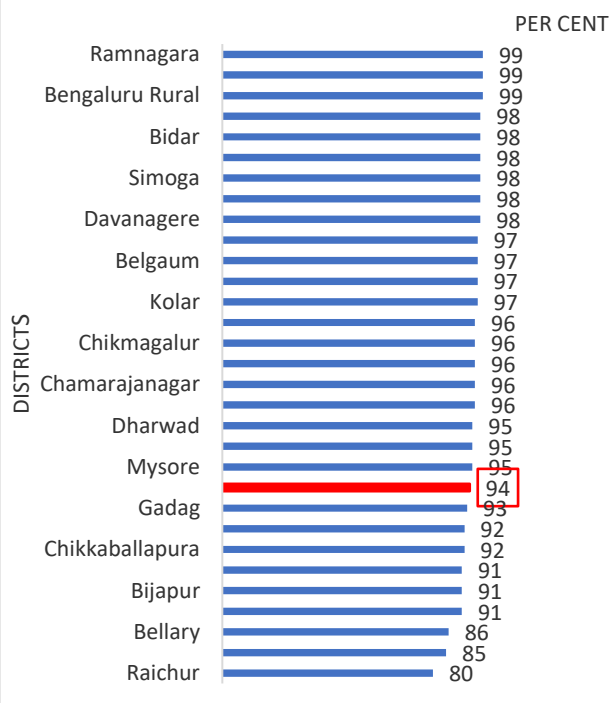

Figure 4 Institutional delivery in the districts of Karnataka, 2015-16

***Source**: NFHS-4 (2015-16)*

In some districts, the rural areas have a higher percentage of institutional delivery than their urban counterparts. The rural-urban difference is widest in the district of Bellary (16), followed by Gadag (10). In the districts of Bangalore, Yadgiri and Udupi, the rural-urban difference is just 3 per cent. In the district of Gulbarga and Hassan, the difference is only two and in it is 1. In the following districts, urban areas have a higher percentage of institutional delivery than rural areas. The urban-rural difference is most heightened in the Haveri district (9.8), and it is lowest in Mysore (0.1). In Uttara Kannada, the difference is 4.2, and in Mandya, it is 1.8. Kodagu (3.6), Chamarajanagar (3.5) and Tumkur (3.4) are the other districts in which the urban areas show a significantly higher percentage of institution delivery compared to the rural areas.

Table 4 shows the institutional delivery by background characteristics. The proportion of births in health facilities was higher in urban areas than in rural areas. But the difference is not much. Institutional deliveries were lower among Scheduled Tribe and Scheduled Caste and Don't know categories. The lower caste in Karnataka, such as ST and SC, are less likely to deliver birth in Health facilities than women who do not belong to these groups. Sikh, Christian, and other minority religious groups have a comparatively higher proportion of institutional births than other religious groups.

Table 3 Urban-Rural difference in Institutional delivery, Districts of Karnataka, 2015-16

District	Rural	Urban	Difference (U-R)
Belgaum	97.7	97.7	0
Bagalkot	95.3	95	0
Bijapur	94.5	95	0
Bidar	97.9	98	0
Raichur	80.5	81	0
Koppal	88.5	89	0
Gadag	97.9	88	-9.9
Dharwad	98.5	98	-0.6
Uttara Kannada	94.3	99	4.2
Haveri	84.5	94	9.8
Bellary	100	85	-15.5
Chitradurga	100	100	0
Davanagere	100	100	0
Shimoga	97.3	100	2.7
Udupi	100	97	-2.7
Chikmagalur	100	100	0
Tumkur	96.6	100	3.4
Bangalore	100	96.6	-3.4
Mandya	98.2	100	1.8
Hassan	100	98	-1.8
Dakshina Kannada	100	100	0
Kodagu	96.4	100	3.6
Mysore	96.3	96.4	0.1
Chamarajanagar	92.8	96.3	3.5
Gulbarga	94.7	93	-1.9
Yadgiri	97.6	94.7	-2.9
Kolar	97.6	97.6	0
Chikkaballapura	97.6	97.6	0
Bangalore Rural	100	100	0
Ramanagara	100	100	0

***Source**: NFHS-4 (2015-16)*

***Note:** minus (-) sign indicates rural areas have a higher percentage*

Conversely, Hindu women have a lower proportion than Muslims. Education has a positive association with institutional delivery. As the level of education increases, the percentage of institutional delivery also rises. The percentage of institutional delivery among women with education was 85.6, whereas it was as high as 98.8 per cent among women with higher education. Women who engaged in the professional occupation are more likely to give birth at health institutions-women who are household, and domestic workers are also more likely to give birth at health facilities.

Conversely, women who engaged in clerical and sales were less likely to give birth at health facilities than women with other occupations. According to the wealth index, women with the poorest wealth index have the lowest institutional deliveries. As the wealth index increases, the percentage of institutional delivery also increases. However, there was not much difference in the percentage of institutional delivery in the richer and richest wealth quintile.

According to a study of three districts in Northern Karnataka, the perception of poor quality of care and facilities at government institutions plays a significant role in discouraging public institutional delivery. This suggests a need to address negative perceptions of health care quality, particularly in government hospitals. Furthermore, institutional delivery perceptions may be improved by reducing the number of medically

unnecessary C-sections and ensuring consistent coverage by schemes and comprehensive outreach to marginalised communities by ASHAs (Bruce et al., 2012). A study of institutional deliveries in Karnataka found significant disparities between castes in institutional deliveries. General Caste mothers were twice as likely as scheduled caste and tribe mothers to have an institutional birth. Other Backward Class mothers are also more likely to have institutional deliveries than Scheduled Tribes and Scheduled Caste mothers. Therefore, the study suggested that there should be a focus on the health of the ST and SC in health intervention.

Table 4 Percentage of Institutional delivery by background characteristics, Karnataka, 2015-16

Institutional delivery	Per cent	Frequency	Total
Place of Residence			
Rural	94	4298	4573
Urban	95.9	3162	3297
Caste			
ST	91.3	694	760
SC	91.9	1535	1671
OBC	96.3	3556	3693
None of them	96.5	738	765
Don't know	82.9	58	70
Religion			
Hindu	94.5	5873	6217
Muslim	95.5	1316	1378
Christian	98.4	239	243
Sikh	100	1	1
Others	100	30	30
Education			
No education	85.6	1054	1231
Primary	90.5	673	744
Secondary	96.9	4708	4857
Higher	98.8	1025	1037
Occupation			
Not working	95.5	911	954
Professional	100	62	62
Clerical & sales	87.5	7	8
Household and domestic services	100	69	69
Agriculture & Manual	94.6	6401	6766
Don't know	90.9	10	11
Wealth Index			
Poorest	87.3	399	457
Poorer	91.2	1385	1518
Middle	94.8	2085	2199
Richer	97.6	2188	2241
Richest	96.5	1402	1453

Source: NFHS-4 (2015-16)

Addressing these communities' needs will be critical in achieving the government's health-related goals (Adamson et al., 2012). A study in Bellary revealed that institutional delivery did not help prevent practices related to delayed breastfeeding, supplementary feeding, and prolateral feeds. As a result, focusing solely on institutional delivery appeared ineffective in changing people's perceptions and beliefs. Despite their proximity, the non-use of health facilities for delivery necessitates a reconsideration of the availability, affordability, and quality of services at these facilities. Institutional delivery may not be the best solution for infant and childcare practices. Continuous efforts through campaigns and awareness activities, combined with mass media, may improve healthcare practices. Health system research and study of local traditions are needed before implementing a tailor-made strategy for enhancing the healthcare practices and behaviour in a district (Jain et al., 2012).

4. POSTNATAL CARE (PNC)

The health of the mother and her newborn child is determined not only by the care she receives during pregnancy and delivery but also by the postpartum care she and the infant receives. Figure 3 shows the percentage of mothers who received postnatal care from a doctor/nurse/LHV/ANM/Midwife/other health personnel within two days of delivery. Postnatal care visits by mothers and children have improved substantially since NFHS-3. For instance, from 2005to 2006, 61.2 per cent of mothers received postnatal care from health personnel within two days of delivery, which increased to 87.4 per cent during 2019-20. In rural areas, the proportion of mothers who received postnatal care from health personnel increased from 59.9 per cent in 2005-06 to 87.4 per cent in 2019-20. However, urban areas show a fluctuating trend. It was 70.2 per cent in 2005-06, but it decreased to 66.6 per cent in 2015-16. Afterwards, it started to increase again and reached 87.4 per cent in 2019-20.

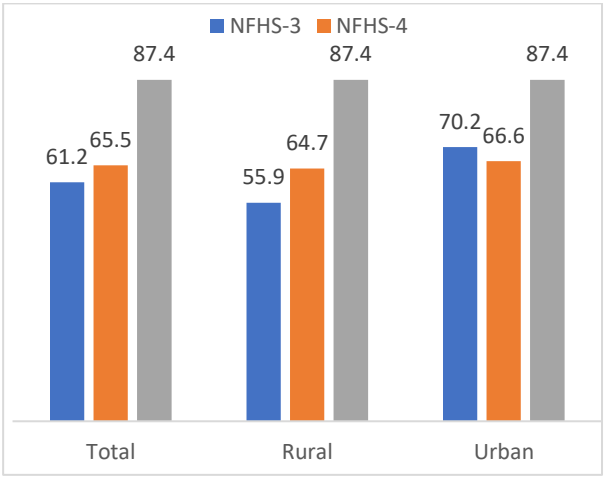

Figure 5 Mothers who received postnatal care from Health Personnel within two days of delivery (%)

***Source**: Fact sheets of NFHS-3,4 &5*

Figure 6 depicts the proportion of women who had a postnatal check within two days of giving birth. As shown in the figure, 66 per cent of women had a postnatal check within two days after delivery. There is a wide variation between districts regarding postnatal care within two days. It is as high as 90 per cent in the Belgaum district; on the other hand, it is as low as 41 per cent in Gulbarga. Haveri and Chitradurga districts have the same percentage as Karnataka as a whole. Gulbarga, Bellary, Bagalkot, Raichur, Yadgiri, Koppa, Tumkur, Bijapur, Chikmagalur, Bengaluru Rural, Davanagere, Chikkaballapura and Shimoga districts have a percentage lower than the state's average. Belgaum district is the only district where the postnatal check-up is 90 per cent. In Gadag, Uttara Kannada, and Kolar, 81 per cent of the women have a postnatal check-up within two days after delivery. Kodagu, Bengaluru, and Udupi districts have 69,68 and 67 per cent, respectively. Dharwad, Hassan, and Bidar have 70 per cent of postnatal care. In Mandya and Ramanagara, it is 72 per cent. Chamarajanagar and Dakshin Kannada have 74 per cent of postnatal care, and in the Kolar district, it is 75 per cent.

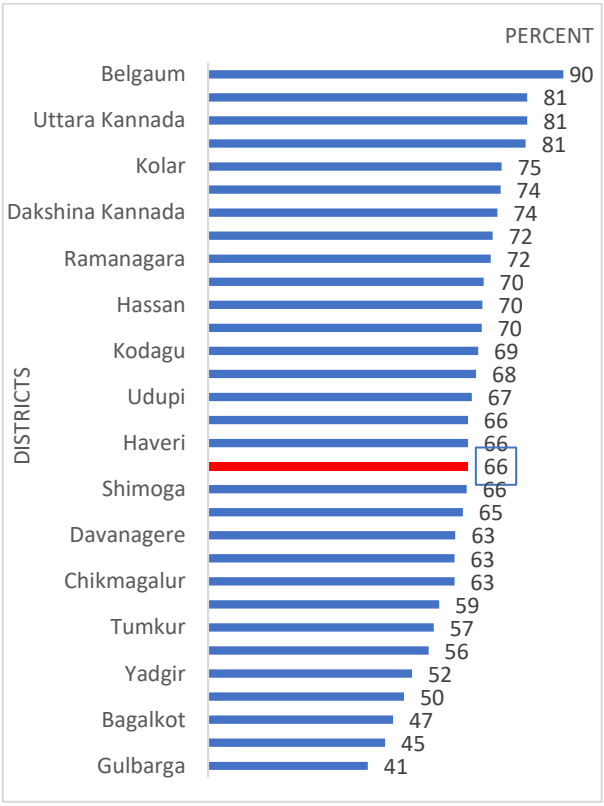

Figure 6 Women with a postnatal check within two days of delivery

***Source**: NFHS-4 (2015-16)*

Table 5 Postnatal care visits by mother within two days of delivery by background characteristics

Characteristics	Per cent	N
Mother's age at birth		
<20	66.5	641
20-34	66	5,149
35-49	62.7	135
Residence		
Rural	65.3	3,443
Urban	66.9	2,482
Birth order		
1	69.9	2,399
2- 3	64.3	3,181
4+	53.3	346
Mother's schooling		
No schooling	50	931
< 5 years completed	61	288
5-9 years complete	68.2	1,659
10-11 years complete	70.9	1,471
12 or more years complete	69.4	1,577
Religion		
Hindu	65.9	4,682
Muslim	65.4	1,038
Christian	72.2	183
Caste/tribe		
Scheduled caste	66.7	1,259
Scheduled tribe	60.4	572
Other backward class	65.2	2,781
Other	69.6	1,262
Don't know	63.1	52

***Source**: NFHS-4 (2015-16)*

Table 5 shows the mother's postnatal care visits by background characteristics within two days of delivery. There is not much difference in postnatal care visit my mother's age at birth in the age group < 20 and 20-34. However, it is comparatively low among mothers whose age at birth is 35-49 years. There is not much difference in postnatal care visits by mother by residence. Birth order and postnatal care visits have a negative relationship within two days of delivery. The postnatal care visit decreases as the birth order increases. Postnatal care visit is the lowest among mothers with no schooling.

On the other hand, it is highest among mothers who completed 10-11 years of schooling. By religion, postnatal care is highest among Christians. There is not much difference between Hindus and Muslims. Scheduled Tribe (ST) mothers have the lowest postnatal care visits in Karnataka.

In their study, Vidler et al. (2016) found that Karnataka has one of the highest maternal mortality rates in South India. They suggested that community-based initiatives encourage early disclosure of pregnancies and provide the community with information regarding the importance of facility-based care. Paudel et al. (2014), in their study, found that more than three-quarters of Belgaum had used the proper postnatal maternity services. Education, family income, awareness, and delivery were the most significant determinants of postnatal care utilization. Udgiri (2017), in her study of cultural practices related to postnatal care, found that there exist harmful cultural practices regarding postnatal care in Karnataka. This should be avoided by educating and counselling the mother and her family. She suggested displaying pictures about harmful practices with an educational message in health centres for creating awareness. Many potentially harmful newborn care practices, such as unsanitary cord-cutting, delayed breastfeeding, and early breathing, are practised in the study area, according to a study conducted in rural Karnataka. Some people are more open to change than others, depending on the strength of their underlying beliefs and the acceptability of alternative care. Community education should be focused on the health programs of Karnataka (Kesterton & Cleland, 2009).

5. VACCINATION

Vaccinating children against six severe but preventable diseases, including tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis, and measles, has long been a cornerstone of India's child healthcare system. The National Immunization Program of India is routinely implemented as part of the National Health Policy. Vaccination is one of the most effective ways to protect children's lives and futures. It is critical to a child's survival; failing to receive routine immunizations can result in death. India has made significant progress in improving maternal and child health since 2010. In 2014, the country was declared polio-free, and in 2015, maternal and neonatal tetanus were eradicated. The Ministry of Health and Family Welfare, Government of India, launched Mission Indradhanush on December 25, 2014, as part of the National Health Mission. It aims to immunise all children under the age of 2 years. Under this scheme, Bengaluru Urban, Gulbarga, Raichur, Bellary, Koppal and Yadgiri were covered.

Figure 7 shows the percentage of fully vaccinated children aged 12-23 months. The National Family Health Survey data indicate that there has been progress in immunisation coverage for children in Karnataka. Vaccination coverage

increased significantly between NFHS-3 and NFHS-5. Full immunisation coverage was 55 per cent during 2005-06, which increased to 62.6 per cent in 2015-16 and further increased to 84.1 in 2019-20. Except for the NFHS-3, full vaccination coverage is higher in rural areas than in urban areas. The metropolitan areas attract many people from different parts of the state and even other states. Many of these labour immigrants were settled in slum areas where health facilities are difficult to access. That could be one reason for low immunisation coverage in urban areas compared to rural areas.

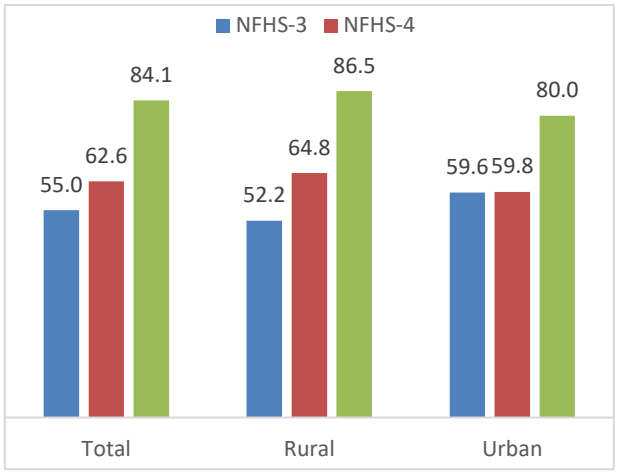

Figure 7 Children aged 12-23 who received full vaccination
Source: *NFHS-3,4 &5*

Figure 8 depicts the percentage of children aged 12 to 23 months who received full vaccination in Karnataka districts. As per the NFHS-4 data, less than two-thirds (63%) of children in the state were fully immunised with all vaccines. Bengaluru, Yadgiri, Mandya, Bidar, Chamarajanagar, Ramanagara, Gulbarga, Bijapur, Dharwad, Chitradurga, Gadag, Mysore, Shimoga and Chikmagalur have immunisation coverage with lower than the state's average. Even though all the vaccines under the routine immunisation programme are provided free of cost, the current immunisation coverage level is still low. The desired goal of the government is at least 85 per cent of immunisation coverage. In Karnataka, Dakshina Kannada has the highest immunisation coverage (77%). However, it is much lower than the desired level. The other districts with higher immunisation coverage include- Kolar, Bagalkot, Davanagere, Koppal and Bellary. The immunisation coverage is the lowest in the district of Chikmagalur. Shimoga, Mysore, Gadag and Chitradurga have immunisation coverage of less than 50 per cent.

Table 6 shows the immunisation coverage by background characteristics. The gender gap in vaccination coverage has been shown to exist in the state of Karnataka. Boys are significantly more likely to receive full immunisation than their female counterparts. Religion also plays a crucial role in accessing immunisation coverage. In Karnataka, Christians are less likely to receive full vaccination than other religious groups. Children's full vaccination also varies according to the caste system. The lower caste, such as ST and SC, are less likely to receive full vaccination than the forward caste. Rural areas have a higher rate of full vaccination coverage than urban areas (64.8 vs 59.8). The birth order and full vaccination have a negative association. As the birth order increases, the vaccination coverage decreases. Infants born in a higher birth order have lower vaccination coverage. Full vaccination is comparatively lower among mothers who completed less than five years of schooling. There is not much difference in the remaining categories of education.

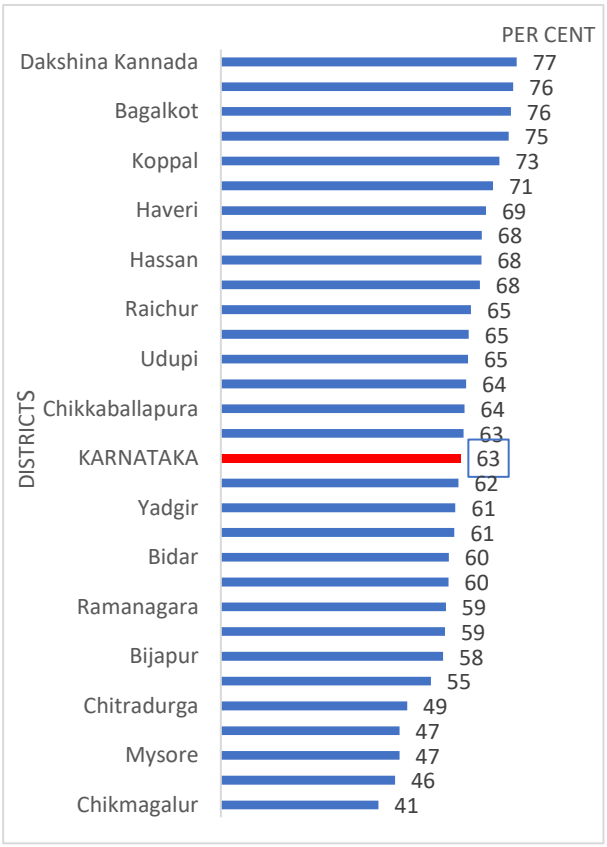

Figure 8 Vaccination coverage in Districts of Karnataka, 2015-16
Source*: NFHS-4 (2015-16)*

Table 6 The immunisation coverage by background characteristics

Characteristics	Percent	N
Sex		
Male	59.9	846
Female	65.5	756
Residence		
Rural	64.8	890
Urban	59.8	711
Birth order		
1	65.6	748
2 – 3	60.4	780
4 – 5	54	67
Mother's schooling		
No schooling	63.2	241
< 5 years completed	58.4	95
5-9 years complete	62.2	406
10-11 years complete	61.9	421
12 or more years complete	64.1	439
Religion		
Hindu	62.4	1,253
Muslim	65.2	295
Christian	53	52
Caste/tribe		
Scheduled caste	60.1	293
Scheduled tribe	53.1	166
Other backward class	63.3	752
Other	66.6	379
Don't know	62.6	1,601

Source*: NFHS-4 (2015-16)*

A study of the immunisation status of infants living in an urban community in North Karnataka discovered that vaccination coverage for children aged 12-23 months was still lower than the expected level of coverage prescribed by the government. The mother's literacy and the family's socio-economic status were significantly associated with children's vaccination. Lack of motivation and obstacles were found to be the significant reason for the partial vaccination of children. As a result, adequate health education, proper training, motivation, better monitoring, supervision, and service strengthening are required to increase vaccine coverage(Bhandari et al., 2015). A study conducted in rural areas of the Bijapur district discovered that, while vaccination coverage has improved over the years, it is still falling short of the district's average and the Universal Immunization Programme target of 85% coverage. One of the reasons for the overall lower coverage of immunisation is the gender of the child, as more males were fully immunised than female children(KJ & MM, 2015). According to a study conducted in Bagalkot's urban areas, 83% of children are fully vaccinated. The main reason for the immunisation failure was a lack of awareness of parents' and grandparents' immunization schedules and negligence. Though the immunization coverage in Bagalkot is relatively high compared to that of other areas of the country, there is still room for improving it. A more vigorous awareness campaign is to be brought about in this area to achieve 100 per cent coverage (Srivastava & Shankar, 2017).

6. DISCUSSION

Karnataka has three main geographical zones: a coastal region, a hilly region along the Western Ghats, and a region covering the Deccan plateau. The state's northern part has a significant population of Scheduled Castes, Scheduled Tribes, and other minorities. The northern region is lacking behind on several human development indicators, including health. Though maternal and child health in Karnataka is better than the national average, more progress is needed. There is a wide variation between districts within the state. Overall, Bagalkot, Ramanagara, Belgaum, Dakshina Kannada, Bengaluru Urban, Bengaluru Rural, Uttara Kannada, Hassan, Mysore and Davanagere performed comparatively better than other districts. On the other hand, Koppal, Raichur, Gulbarga, Chikmagalur, Bellary, Shimoga, Yadgiri, Bijapur, Gadag, and Chitradurga have comparatively lower.

Among the indicators reviewed in this paper, Karnataka performs best in institutional delivery. Some districts such as Ramanagara, Mandya and Bengaluru Rural have 99 per cent institutional delivery. Even in the lowest districts, institutional delivery is 80 per cent. On the other hand, the vaccination coverage is not up to expectation. Despite a longstanding Universal Immunisation Program, the vaccination coverages remained low in the state. In the Dakshina Kannada district, the full vaccination coverage is 70 per cent. However, it is still lower than the government's recommended level of vaccination coverage. More boys were fully vaccinated than girls. Mothers' vaccination coverage with no schooling could lack awareness of parents' vaccination schedules and negligence. Therefore, more awareness about the importance and schedule of routine vaccination is still needed.

Unlike other states, there is not much difference between the rural and urban areas in Karnataka regarding health indicators. In some indicators, the rural areas perform better than the rural areas. This may be due to the poor conditions of urban slums. Only eight cities were included in the National Family Health Survey for slum estimates. Delhi, Meerut, Kolkata, Indore, Mumbai, Nagpur, Hyderabad, and Chennai. Unfortunately, no cities from Karnataka were included in slum estimates. Therefore, little is known about urban poor or slum health in Karnataka.

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