

**An Assessment of C Section Deliveries and Linkages with Obstetric  
Complications in Maharashtra, 2014-15**

Report prepared by

**Vini Sivanandan  
Arun Pisal  
Vandana Shivnekar**

**Population Research Centre  
Gokhale Institute of Politics and Economics  
Pune – 411 004**

December 2015

(A Report prepared for the Ministry of Health and Family Welfare, Government of India, New Delhi)

## Table of Contents

<b>1. Executive Summary</b>	<b>4</b>
<b>2. Introduction</b>	<b>7</b>
<b>3. Trends in C Section deliveries in Maharashtra</b>	<b>8</b>
<b>Figure 1: Percentage of C section deliveries in Public health Institutions, 2014-15</b>	<b>8</b>
<b>Figure 2: Percentage of C section deliveries in Public health Institutions, 2014-15</b>	<b>8</b>
<b>Figure 3: Percentage of C section deliveries in Public health Institutions, 2014-15</b>	<b>9</b>
<b>Figure4: Percentage of C section deliveries in Private health Institutions, 2014-15</b>	<b>10</b>
<b>Figure5: Percentage of C section deliveries in Private health Institutions, 2014-15</b>	<b>10</b>
<b>Figure6: Percentage of C section deliveries in Private health Institutions, 2014-15</b>	<b>11</b>
<b>Figure7: Facility wise C section deliveries in Top 5 Districts with C-sections deliveries in public health Institutions</b>	<b>12</b>
<b>Figure8: Facility wise C section deliveries in private health Institutions in Top 5 Districts</b>	<b>13</b>
<b>4 C section deliveries in Public and Private Health Institutions in HMIS and DLHS-4</b>	<b>13</b>
<b>Figure 9: C section deliveries in private health Institutions in Top 5 Districts HMIS vs DLHS4</b>	<b>13</b>
<b>Figure 10: C section deliveries in public health Institutions in Top 5 Districts HMIS vs DLHS4</b>	<b>14</b>
<b>Figure 11: C section deliveries in private health Institutions in bottom 5 Districts HMIS vs DLHS4</b>	<b>14</b>
<b>Figure 12: C section deliveries in public health Institutions in bottom 5 Districts HMIS vs DLHS4</b>	<b>15</b>
<b>5 Region wise C-section deliveries in Maharashtra</b>	<b>15</b>
<b>Figure 13: Percentwise distribution of c section deliveries of districts in Vidarbha-Amravati, 2014-15</b>	<b>16</b>
<b>Figure 14: Percentwise distribution of c section deliveries of districts in Vidarbha-Amravati, 2013-14</b>	<b>16</b>
<b>Figure 13: Percentwise distribution of c section deliveries of districts in Vidarbha-Amravati, 2014-15</b>	<b>17</b>
<b>Figure 14: Percentwise distribution of c section deliveries of districts in Vidarbha-Amravati, 2013-14</b>	<b>17</b>
<b>Figure 15: Percentwise distribution of c section deliveries of districts in Konkan, 2014-15</b>	<b>18</b>
<b>Figure 16: Percentwise distribution of c section deliveries of districts in Konkan, 2013-14</b>	<b>18</b>
<b>Figure 17: Percentwise distribution of c section deliveries of districts in Marathwada, 2014-15</b>	<b>19</b>

<b>Figure 18: Percentwise distribution of c section deliveries of districts in Marathwada, 2013-14</b>	<b>19</b>
<b>Figure 20: Percentwise distribution of c section deliveries of districts in Kandesh, 2014-15</b>	<b>20</b>
<b>Figure 21: Percentwise distribution of c section deliveries of districts in Kandesh 2013-14</b>	<b>20</b>
<b>Figure 22: Percentwise distribution of c section deliveries of districts in Dsh-Pune, 2014-15</b>	<b>21</b>
<b>Figure 23: Percentwise distribution of c section deliveries of districts in Kandesh 2013-14</b>	<b>21</b>
<b>6 Obstetric Complications and Treatments</b>	<b>22</b>
<b>Figure 24: Number of C-section deliveries, and obstetric complicated cases with treatment of IV antibiotics and IV Oxytocic in top 5 districts, 2014-15</b>	<b>22</b>
<b>Figure 25: Number of C-section deliveries, and obstetric complicated cases with treatment of IV antibiotics and IV Oxytocic in bottom 5 districts, 2014-15</b>	<b>23</b>
<b>7. Regionwise type of treatment provided to Obstetric Complicated cases, 2014-15</b>	<b>23</b>
<b>Figure 26 : Percentwise type of treatment provided to Obstetric Complicated cases in Vidharbha-Amravati, 2014-15</b>	<b>23</b>
<b>Figure 27 : Percentwise type of treatment provided to Obstetric Complicated cases in Marathwada, 2014-15</b>	<b>24</b>
<b>Figure 28 : Percentwise type of treatment provided to Obstetric Complicated cases in Konkan, 2014-15</b>	<b>24</b>
<b>Figure 29 : Percentwise type of treatment provided to Obstetric Complicated cases in Vidarbha-Nagpur, 2014-15</b>	<b>25</b>
<b>Figure 30 : Percentwise type of treatment provided to Obstetric Complicated cases in Kandesh, 2014-15</b>	<b>25</b>
<b>Figure 31 : Percentwise type of treatment provided to Obstetric Complicated cases in Dsh, 2014-15</b>	<b>26</b>
<b>Relative risk C section deliveries and Obstetric Complicatons in Public to Private Institutions</b>	<b>27</b>
<b>Table1: Relative ratios of Obstetric to non Obstetric cases and C section to normal deliveries in public and Private Institutions of Maharashtra, 2014-15</b>	<b>28-30</b>
<b>8. Summary and Conclusion</b>	
<b>9. References</b>	

## **An Assessment of C Section Deliveries and Linkages with Obstetric Complications in Maharashtra, 2014-15**

### **1.Executive Summary:**

A substantial proportion of deliveries are reported as c section deliveries. A need was felt to assess the increase in c section deliveries and to examine the association between the obstetric complications and c section deliveries in Maharashtra. Data from Health management information System (HMIS 2013-14 & 2014-15) were used to examine the effect of obstetric complications and trends in c section deliveries in all the districts of Maharashtra. The results of this study showed that c section deliveries was highest in Vidarbha region of Maharashtra among women with any obstetric complications compared to women with no obstetric complications. The findings provided key insights for health policy interventions in terms of monitoring the c section deliveries and prevention of obstetric complications to avoid the adverse pregnancy outcome in women.

### **Key Conclusions and Recommendation**

In general c section deliveries are well above the recommended level of 20% and is highly concentrated in private health institutions.

C section deliveries in private health institutions was high in Amravati, Wardha, Gondia Nanded and Chandrapur districts whereas c section deliveries in public health institution was less than 15% in these districts.

Overall c section deliveries was high in Nagpur, Akola and Brihanmumbai districts. Highest c section deliveries was observed **Bhandara** district with more than half of the deliveries in private institution and near to quarter of deliveries in public institution to be c section deliveries.

Monitoring of c section deliveries in both public and private institutions in Bhandara district need to be conducted to understand the cause of high c section deliveries.

The highest percent of C-section deliveries in public health institution is observed in Women Hospital (WH) Akola district (44%), Amravati WH (30%), and Gondia WH (31%) with zero case reported as C-section deliveries in Government Medical College, Akola and District Hospital (DH)

Gondia. This reflects preference of WH over other public health institutions for C-section deliveries.

Even though WH is available in Amravati district the c section deliveries in public institution (13%) is much lower than c section deliveries in private institution (44%).

C section deliveries in public health institutions were less than 20% and well within the limit as prescribed by WHO. Only four districts Brihanmumbai (23%), Sindudurg (27%), Nagpur(28%) and Akola (34%) shows c section deliveries to be more than 20 percent of the total deliveries in public health institutions

Bhandara district reported high percentage of c section deliveries in both public and private institutions. In public health institutions more than half of the deliveries in DH Bhandara were c section deliveries. Similarly, more than half of the deliveries in Private accredited institutions were c section deliveries which is well prescribed the above limit of 15-20% recommended by WHO.

More than quarter of the deliveries in Nagpur district of Vidarbha region was c section deliveries in both public and private health institutions.

High intensity and geographical convenience maybe the reason of high c section deliveries in Brihanmumbai and Thane districts in Konkan belt of Maharashtra which otherwise shows low c section deliveries in other districts of Konkan region.

However, high percentage of c section deliveries is not supported by the high gap in the number of obstetric complication cases in Brihanmumbai this reflects not only unnecessary high c section deliveries but also non recording or reporting of the obstetric complicated cases.

Regionwise Desh regions shows lowest c section deliveries whereas Vidarbha region shows highest concentration of c section deliveries.

Steep increase in private c section deliveries from 2013-14 to 2014-15 was observed in Amravati, Wardha and Latur districts.

Dhule district shows low c section deliveries although nonreporting and underreporting of c section deliveries in public health institution maybe one of the factor.

Districts with high c section deliveries also reported high number of obstetric complicated cases treated with antibiotics and oxytocin which are provided during c section deliveries.

However districts of Brihanmumbai, Nanded and Washim districts shows the number of cases of c section deliveries was almost 20, 4, and 10 times respectively higher than the number of obstetric complicated cases provided with oxytocin and antibiotics. This maybe due to either under or non reporting of treatment provided to obstetric complicated cases or due to unnecessary c section deliveries in these districts.

In general Obstetric complicated cases attended in public health institutions was relatively higher than private health institutions in all the districts except in Sangli, Nasik, Brihanmumbai, Wardha, Bhandara, Osmanabad, Sindudurg and Yavatmal districts.

C section deliveries was higher in private institution than in public institution in all the districts except in Akola, Bid, Parbhani and Sindudurg districts.

Awareness regarding future health complications of c section deliveries need to be provided.

Measures needs to be taken to minimize the inconsistencies, non reporting and underreporting of data. Data can be further refined by type of institutions providing treatment for obstetric complication by stages of pregnancies, background characteristics of the women. C section deliveries data in the form of elective and emergency cases is recommended.

High institutional delivery and geographical location of health institutions seems to have an impact on the concentration of c section deliveries by type and location of health institution. Hence mapping , accessibility and proportionate provision of health services round the clock in the form of specialists, supporting staffs, infrastructure etc need to be strengthened in view of future demand.

### **Probable causes of high c section deliveries in Maharashtra**

High institutional delivery accompanied by limited infrastructure, shortage of specialist and trained manpower. Very few wants to take risk of waiting for normal delivery both from patients and provider side. Moreover due to limited infrastructure and shortage of manpower timely availability of health service the risk of waiting is not a better option for many.

The difficulty and unpredictability in arranging for an emergency c section within short period is another factor that may be contributing to high c section deliveries.

Caesarean delivery in private institutions involves an extended stay in the hospital or nursing homes compared to normal delivery and this, resulting in high cost and time.

If private health institutions soal goal is to earn profit, it is quite possible that c section performed even if not required.

Whereas, in Public health institutions there is serious crunch of resource in terms of provision of beds, specialists and necessary diagnostics and equipments. Patients are also unwilling to stay for the extended time period due to this limited infrastructure.

Loss of wage and household commitments may discourage the expecting mothers to stay for a prolonged period in hospital.

The demand for c section deliveries from highly educated rich urban women who want to avoid labour pain may also be a reason for high c section deliveries in private institution.

Another factor which is emerging is choosing appropriate date and time for child birth which may be auspicious leading to c section deliveries.

## **2.Introduction**

Cesarean section is a surgical procedure in which incisions are made through a woman's abdomen and uterus to deliver her baby to ensure safety of mother and child when vaginal delivery is not possible.

C section deliveries are on rise in Maharashtra, and well above the recommended level of 10-15%, as recommended by WHO. Some of this trend is due to geographical, higher density of public and private health institutions. In Maharashtra, the cost of a C-section varies widely can range from free c section deliveries in a government hospital to Rs 50,000 in private health institutions.

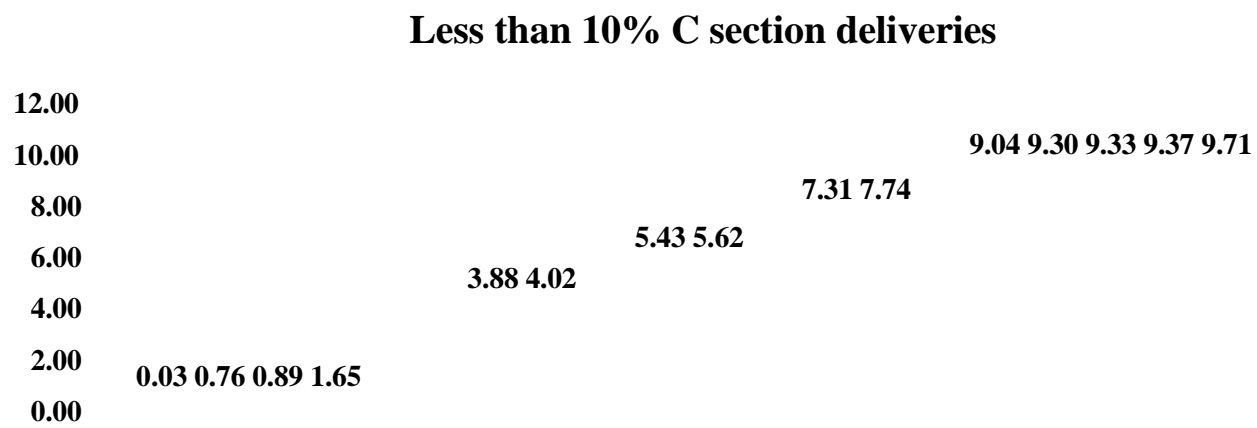
Risk of maternal complications increases as compared with cesarean delivery. Such complications include uterine rupture, which is uncommon but serious and may result in further complications and morbidity.

A major objective of the Safe Motherhood was to identify women with obstetric complications requiring timely treatment. Information on the frequency with which women experience these potentially fatal complications is vital in planning for the services necessary for improved maternal survival. High rate of Obstetric complication is one of the indication of high c section deliveries. Hence, timely treatment, intervention and health services needs to be provided.

This study attempts to examine the trends in c section deliveries in both public and private institution in all the districts of Maharashtra using HMIS data 2014-15. Study also tries to find the linkages between obstetric complicated cases with c section deliveries if any.

### 3. Trends in C Section deliveries in Maharashtra

**Figure 1: Percentage of C section deliveries in Public health Institutions, 2014-15**



**Figure 2: Percentage of C section deliveries in Public health Institutions, 2014-15**

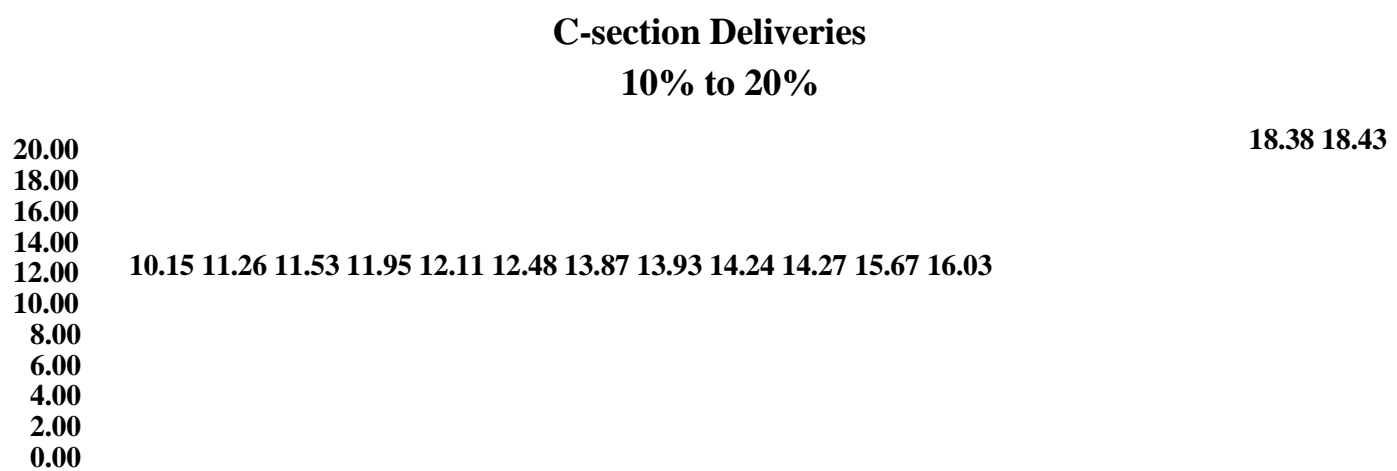
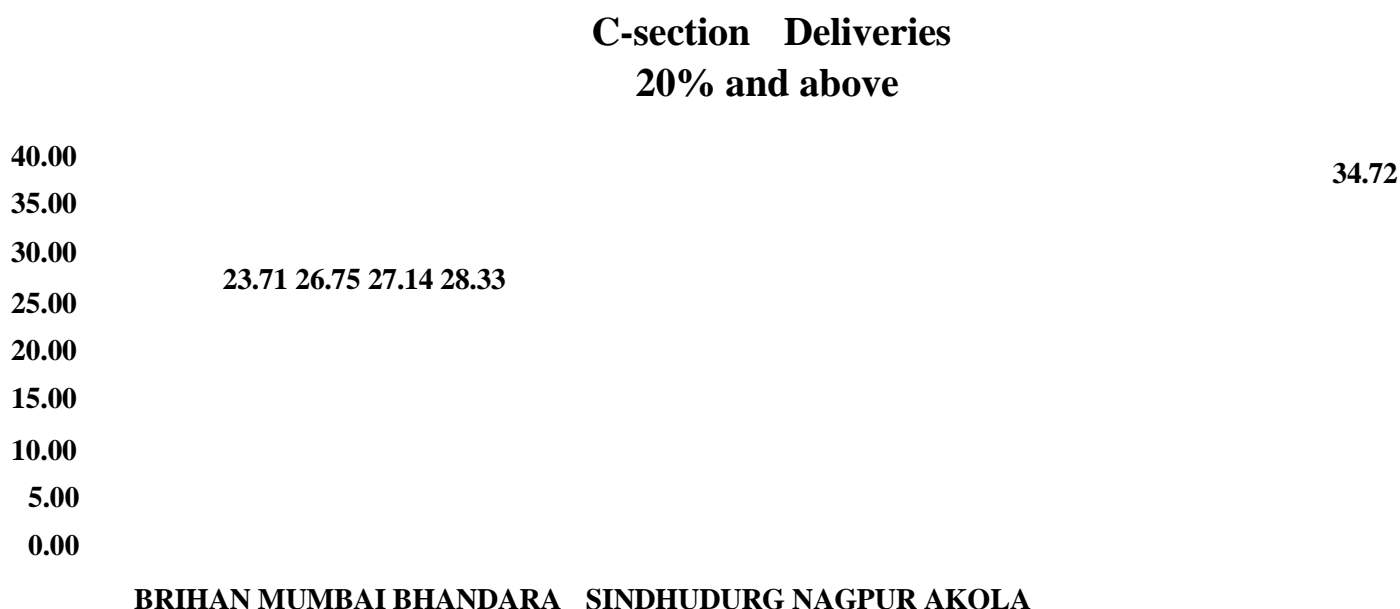


Figure 1 & 2 presents the percentage of c-section deliveries to total deliveries in public health institutions in the range of less than 10 percent and 10-20% respectively. Thirty districts are showing c



section deliveries with less than 20 % which is well within the limit prescribed by WHO. Although, monthwise data for the year 2014-15 are either non reported or under reported in some districts overall c section deliveries in public health institutions are less than 20 percent. This is also supported by some of the PIP reports in these districts. For example, PIP monitoring of Dhule district during the period April to August 2013-14 shows csection deliveries to be less than 5 percent in DH and SDH. In addition in the neighboring districts of Jalgaon, Nasik and Nandurbar the c section deliveries in public institutions were less than 12 percent. This reflects overall c section deliveries in these districts to be less than 20% in public health institutions.

**Figure 3: Percentage of C section deliveries in Public health Institutions, 2014-15**

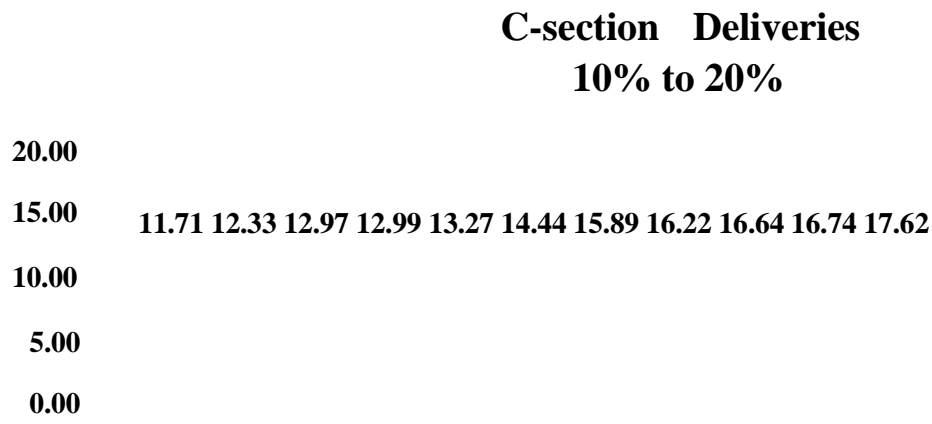


Only four districts Brihanmumbai (23%), Sindudurg (27%), Nagpur(28%) and Akola (34%) as given in the above figure 3 shows c section deliveries to be more than 20 percent of the total deliveries in public health institutions. Brihanmumbai and Sindudurg districts are in the Konkan regions and most likely due to the availability of Medical College, DHs and infrastructure there might be high number of referral patients from neighboring districts to these health institutions. This may also be one of the reason of low c section deliveries in neighboring districts of Raigad, Ratnagiri , and Kolhapur districts. Low c section deliveries in the neighboring districts of Akola such as Buldhana(4.02%) and Washim (0.76%) reflects the preference or accessibility of health services in public health institutions in Akola district. Also, it seems high referral cases of c section deliveries from neighboring districts of Bhandara such as Gadchiroli (9.04%) and Chandrapur (12.48%). However, even with the presence of WH in Gondiya and Amravati district the c section deliveries were only 13 percent. Overall in Public health institutional c section deliveries only four districts were showing more than 20% c section deliveries.

### **C Section deliveries in Private health Institutions**

Figure 4 to 6 presents the c section deliveries in private health institutions. In none of the districts the c section deliveries in private health institution was less than 10%.

**Figure4: Percentage of C section deliveries in Private health Institutions, 2014-15**



Only 11 districts as shown in figure 4 shows less than 20% of c section deliveries in private health institutions which is well within the prescribed limit as recommended by WHO. Only in Sindudurg district private c section deliveries (16%) is lesser than c section deliveries in public health institutions (27%). In rest of the districts the private c section deliveries are higher than c section deliveries in public institutions. This also implies the preference of public health institutions over private health institution for c section deliveries.

**Figure5: Percentage of C section deliveries in Private health Institutions, 2014-15**

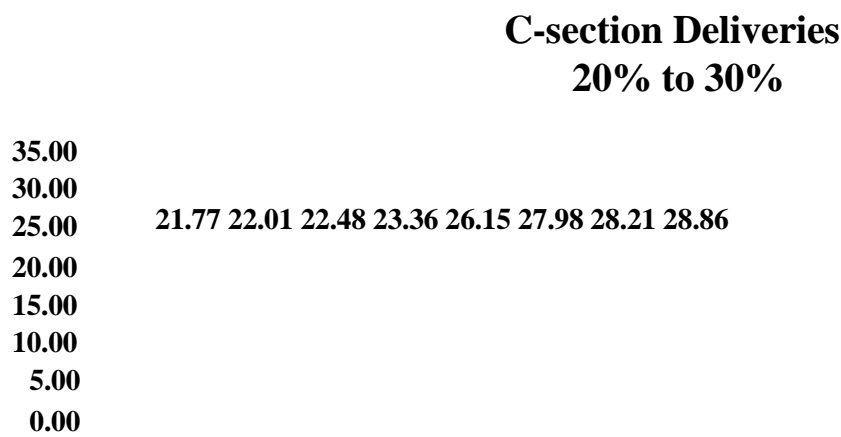


Figure5 shows eight districts with more than 20 percent of c section deliveries in private institutions. Here except for Nagpur district all the other district c section deliveries in public institutions was less than 20 percent whereas in Nagpur district the c section deliveries in both public and private

institutions was almost same of 28 percent. This reflects high percent of c section deliveries in Nagpur district.

**Figure6: Percentage of C section deliveries in Private health Institutions, 2014-15**

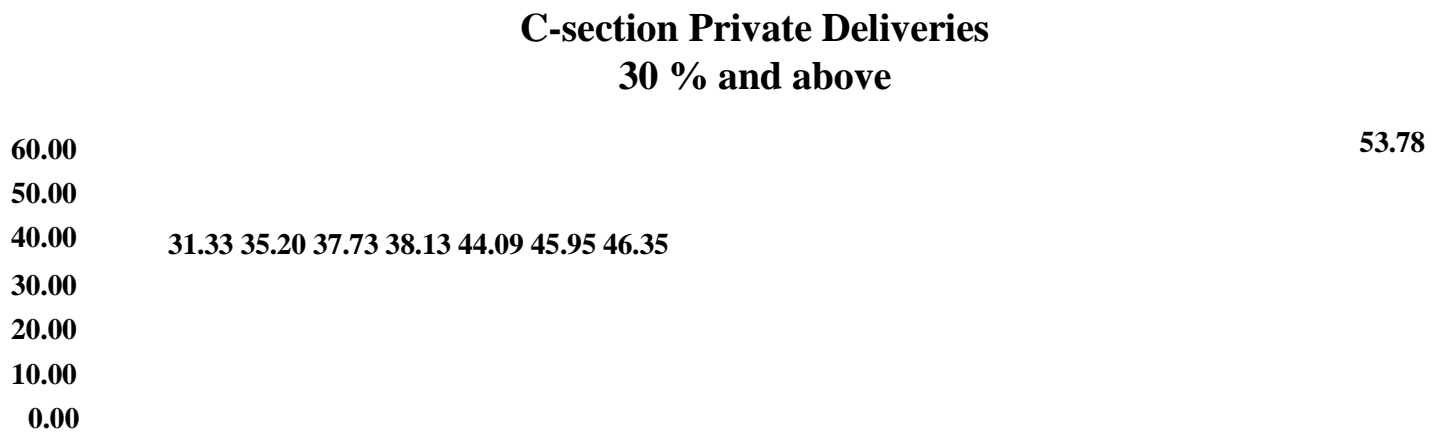


Figure 6 shows c section deliveries conducted in private health institutions as 30% and above. C section deliveries in private health institutions with above 30% and less than 40% was observed in districts of Nanded, Akola, Chandrapur and Brihanmumbai. C section deliveries in public health institutions in Nanded (3.8%) and Chandrapur (12%) was less than 15 percent whereas in Akola(34%)and Brihanmumbai (23%) reflecting overall c section deliveries are high in Akola and Brihanmumbai districts. Highest c section deliveries was observed in Bhandara district with more than half of the deliveries in private institution and near to quarter of deliveries in public institution to be c section deliveries. Near to 45 percent of deliveries in private institution in Amravati, Wardha and Gondia districts was in private health institution whereas in public institution the percentage of c section deliveries was less than 15 percent. Even tough WH is available in Amravati district the c section deliveries in public institution (13%) is much lower than c section deliveries in private institution (44%).

**Figure7: Facility wise C section deliveries in Top 5 Districts with C-sections deliveries in public health Institutions**

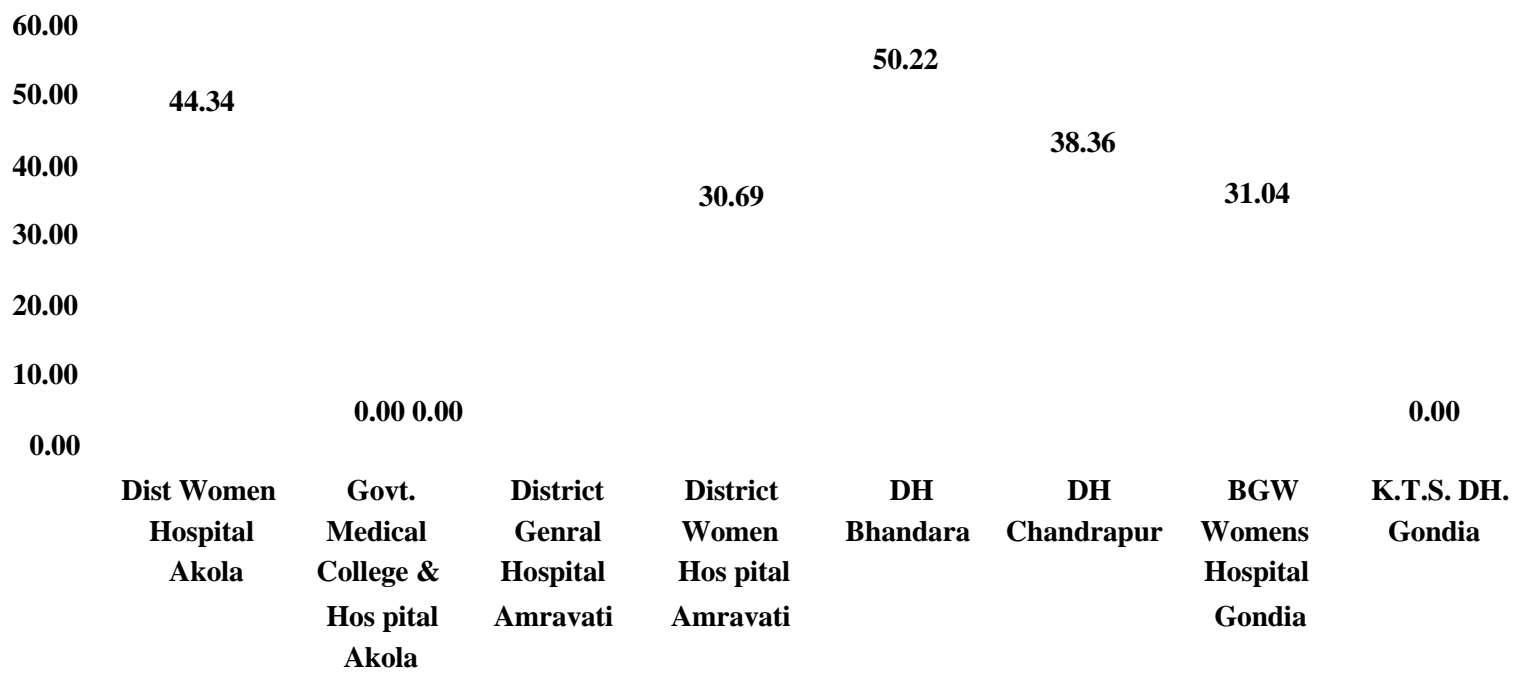
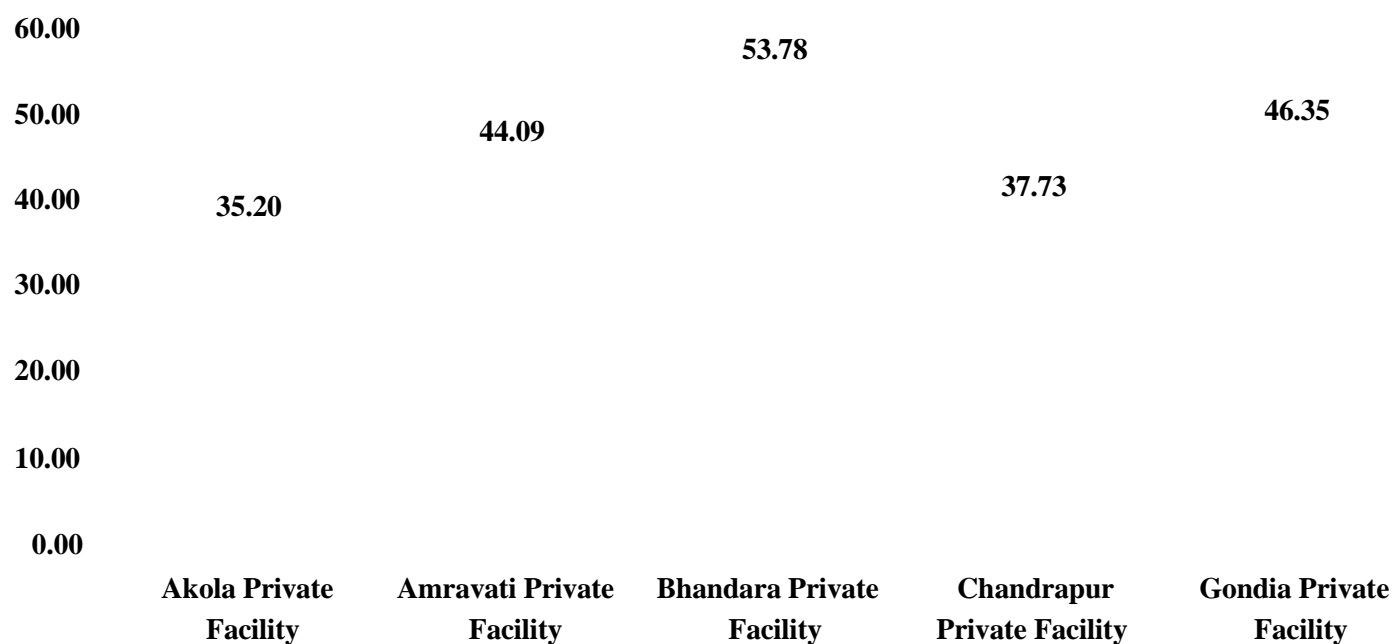


Figure 7, presents facilitywise C section deliveries in public health institutions in top districts with c section deliveries. The highest percent of C-section deliveries in public health institution was observed in WH Akola district (44%), Amravati WH (30%), and Gondia WH (31%). Whereas, zero case is reported as C-section deliveries in Government Medical College, Akola and DH Gondia. This reflects preference of WH over other public health institutions for C-section deliveries.

Further, half the deliveries in DH Bhandara are c section deliveries, followed by DH Chandrapur (38%).

Nearly quarter of the deliveries in Public health institutions in Bhandara district were c section deliveries and mainly concentrated in DH Bhandara

**Figure8: Facility wise C section deliveries in private health Institutions in Top 5 Districts**



Except for C-section deliveries in Public health institutions Akola in all the other Public health institutions C-section deliveries was less than private c section deliveries. More than half of the deliveries in private facilities of Bhandara district were C-section deliveries and near about 45 percent of deliveries in Amravati and Gondia districts were C-section deliveries. Substantially high percentage in Akola (35%) and in Chandrapur (37%) of deliveries was C-section deliveries.

#### 4.C section deliveries in Public and Private Health Institutions in HMIS and DLHS-4

Figure 9: C section deliveries in private health Institutions in Top 5 Districts HMIS vs DLHS4

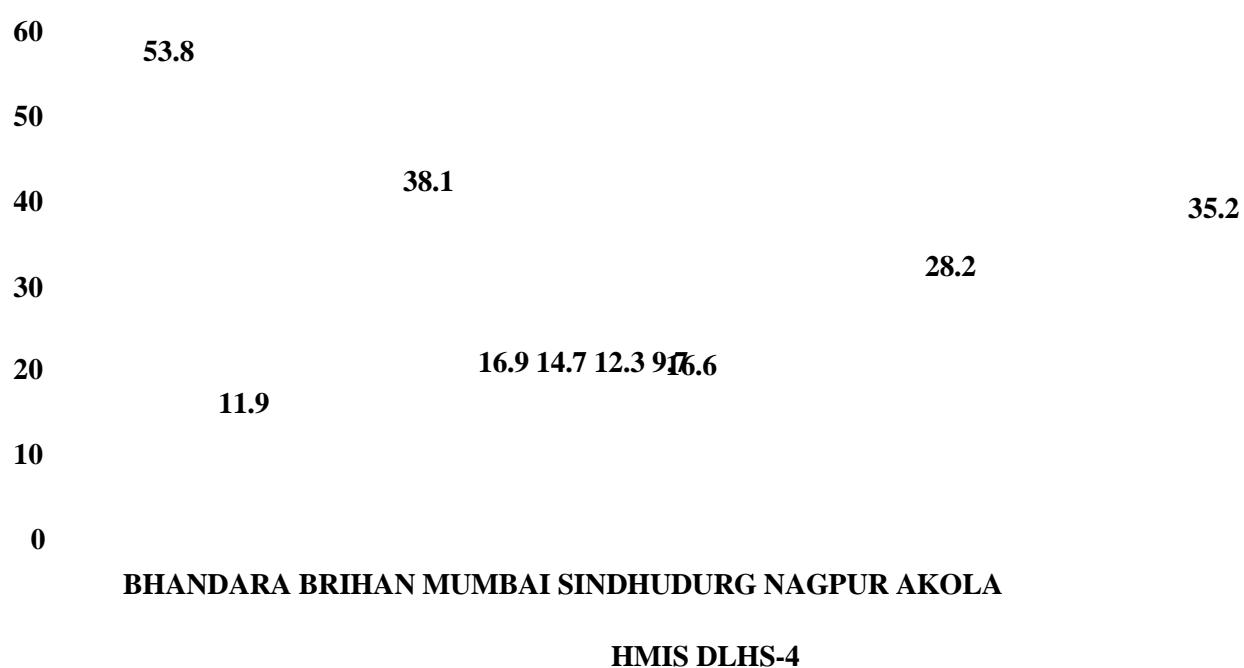


Figure 9 presents the c section deliveries in private health institutions in top 5 districts. Except for c section deliveries in Sindudurg district in the other four districts c section deliveries in HMIS was much higher than c section deliveries in private health institutions in DLHS4. C section deliveries in private

health institutions in Bhandara district was almost five times and four times in Akola district than in DLHS4.

**Figure 10: C section deliveries in public health Institutions in Top 5 Districts HMIS vs DLHS4**

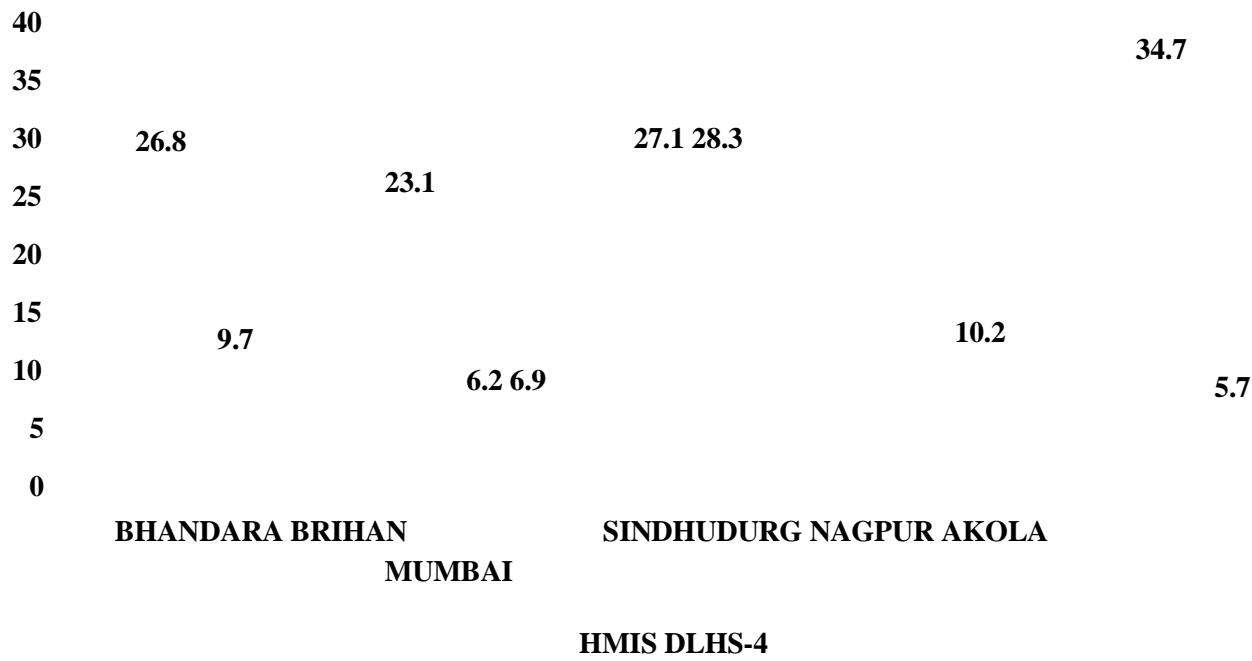


Figure 10 presents the c section deliveries in public health institutions in top 5 districts. C section deliveries in all the districts in HMIS was much higher than c section deliveries in public health institutions in DLHS4. C section deliveries in public health institutions in Akola district was almost seven times and four times in Brihanmumbai and Sindudurg districts district than in DLHS4.

**Figure 11: C section deliveries in private health Institutions in bottom 5 Districts HMIS vs DLHS4**

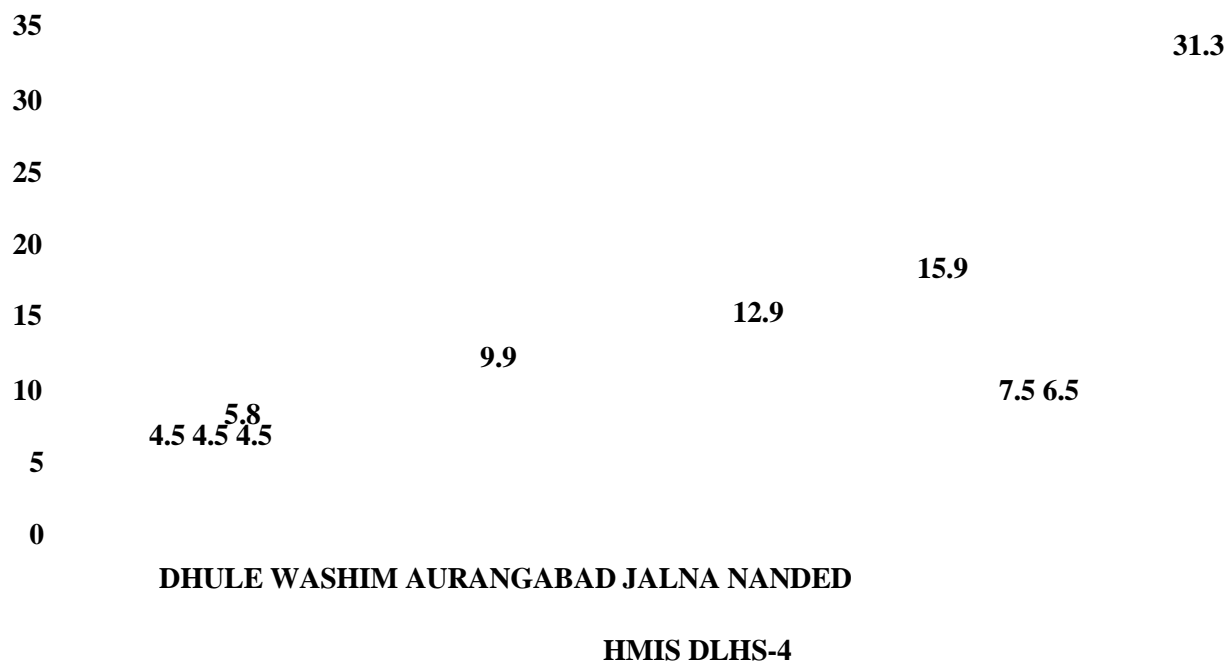


Figure 11 presents the c section deliveries in private health institutions in bottom 5 districts. C section deliveries in Jalna and Nanded districts in HMIS was much higher than c section deliveries in public

health institutions in DLHS4. Whereas, C section deliveries as per DLHS4 in private health institutions in Washim and Aurangabad districts was much higher than in HMIS.

**Figure 12: C section deliveries in public health Institutions in bottom 5 Districts HMIS vs DLHS4**

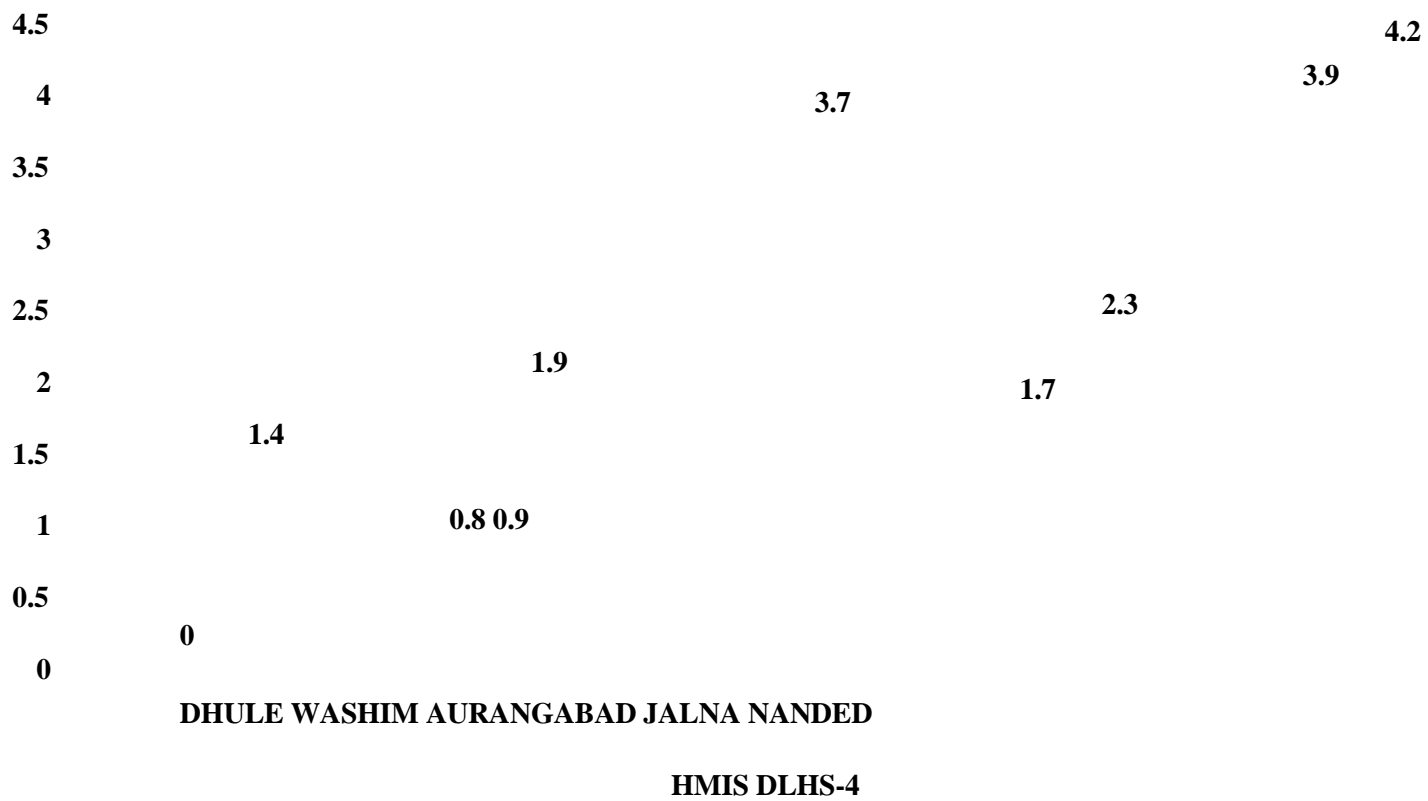
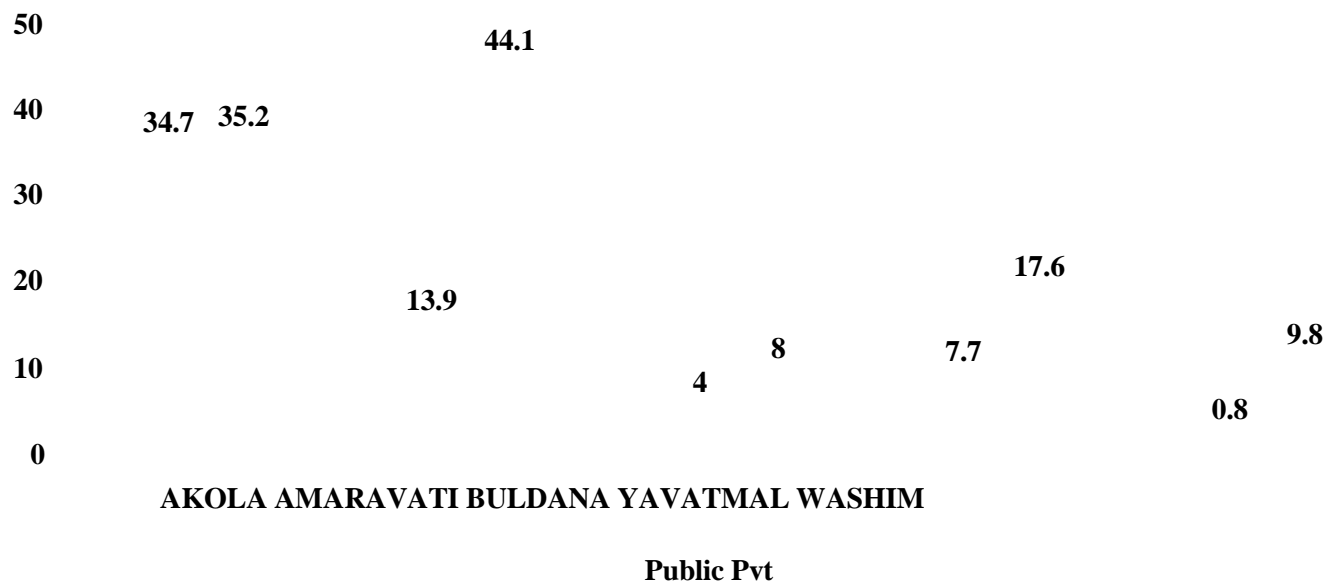


Figure 12 presents the c section deliveries in public health institutions in bottom 5 districts. C section deliveries in all the districts shows HMIS was much lesser than c section deliveries in public health institutions in DLHS4.

### **5. Region wise C-section deliveries in Maharashtra**

As seen in above figures geographical concentration of c section deliveries was observed. To understand the distribution of this concentration of c section deliveries we further examine the c section deliveries in six health administrative regions of Maharashtra namely: Vidarbha-Amravati, Vidharba-Nagpur, Marathwada, Konkan, Desh and Kandesh regions of Maharashtra in both the years 2013-14 and 2014-15.

**Figure 13: Percentwise distribution of c section deliveries of districts in Vidarbha-Amravati, 2014-15**



**Figure 14: Percentwise distribution of c section deliveries of districts in Vidarbha-Amravati, 2013-14**

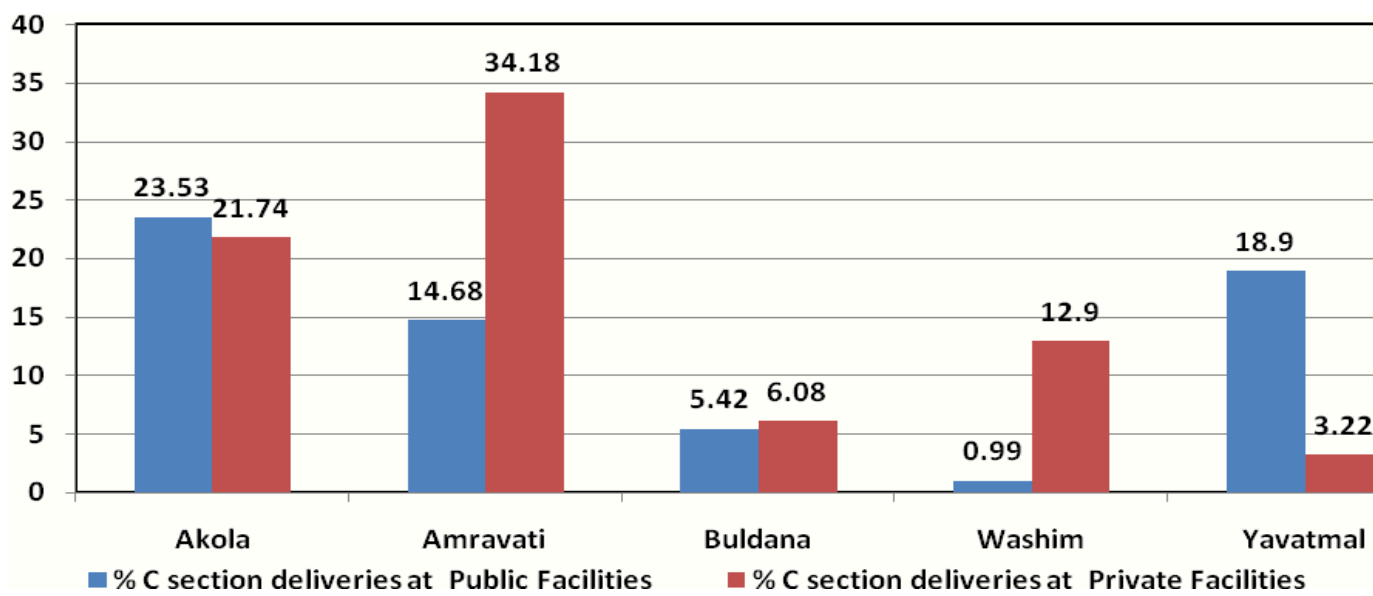
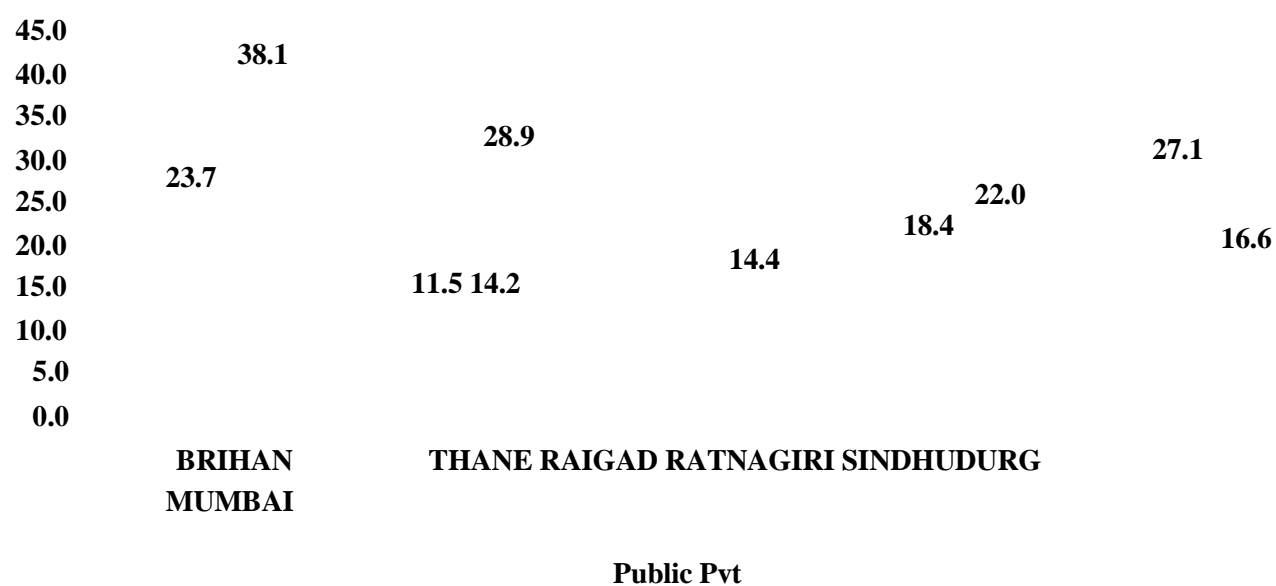


Figure 13 & 14 presents the c section deliveries in both public and private institutions of Vidarbha Amravati region of Maharashtra for the year 2014-15 and 2013-14 respectively. A steep increase of almost 10% increase in csection deliveries is observed in the year 2014-15 as compared to the year 2013-14 except for private c section deliveries in Yavatmal district and public institution c section deliveries in Washim district. C section deliveries in both public and private institutions are mainly concentrated in Amravati and Akola districts where the increase in c section deliveries was the highest. Substantial increase of c section deliveries was observed in private institutions in Amravati



district where the c section deliveries in 2013-14 was 34% and in 2014-15 was 44%. Whereas, in Akola district both public and private institutional deliveries increased to almost 10%. Private c section deliveries was higher than public c section deliveries in 2014-15 whereas in 2013-14 c section deliveries in Yavatmal district was much higher in public health institutions (18%) which decreased considerably to 7 % in 2014-15.

**Figure 15: Percentwise distribution of c section deliveries of districts in Konkan, 2014-15**



**Figure 16: Percentwise distribution of c section deliveries of districts in Konkan, 2013-14**

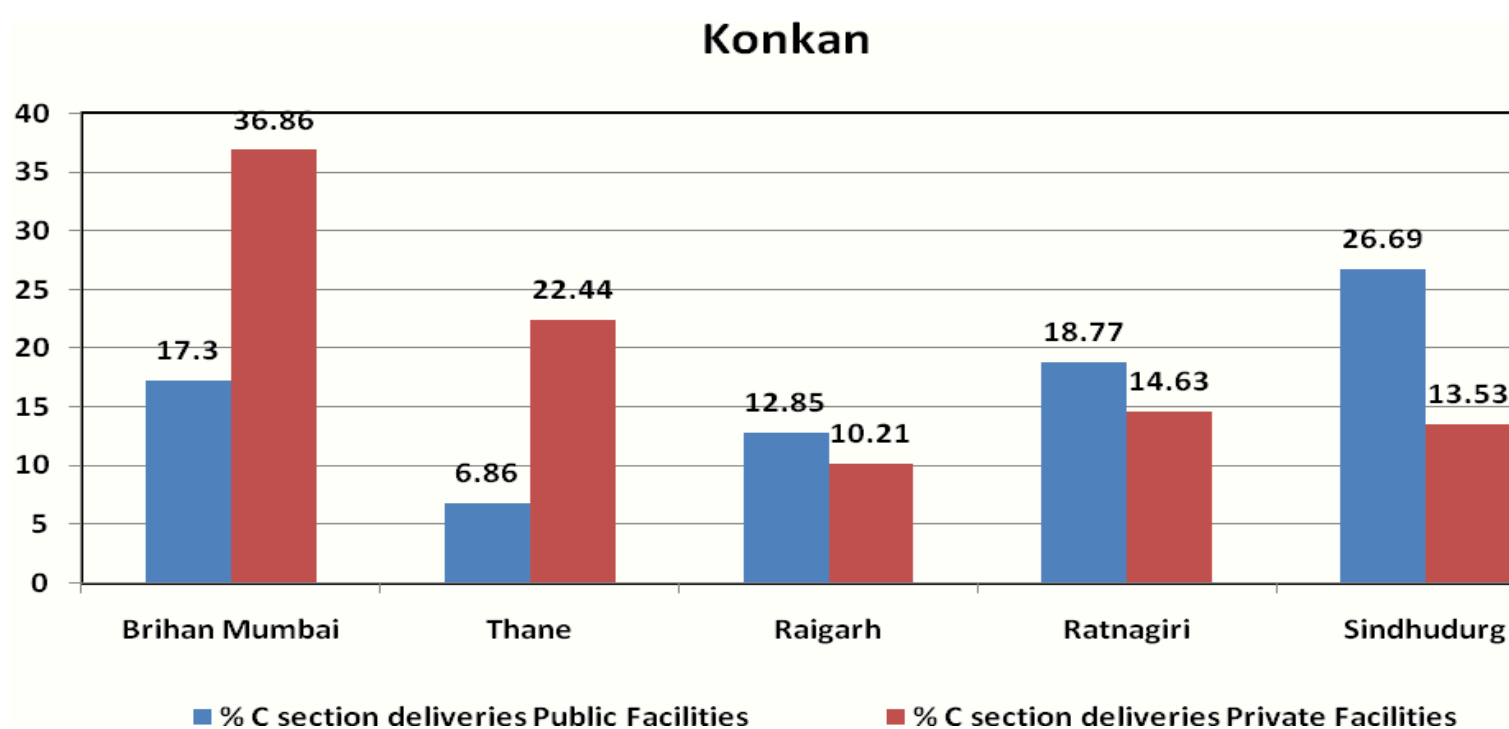


Figure 15 & 16 shows in Konkan region marginal increase in c section deliveries in all the districts in both public and private c section deliveries. In both the years c section deliveries in public health institution was higher than private institutions.

Figure 17: Percentwise distribution of c section deliveries of districts in Marathwada, 2014-15

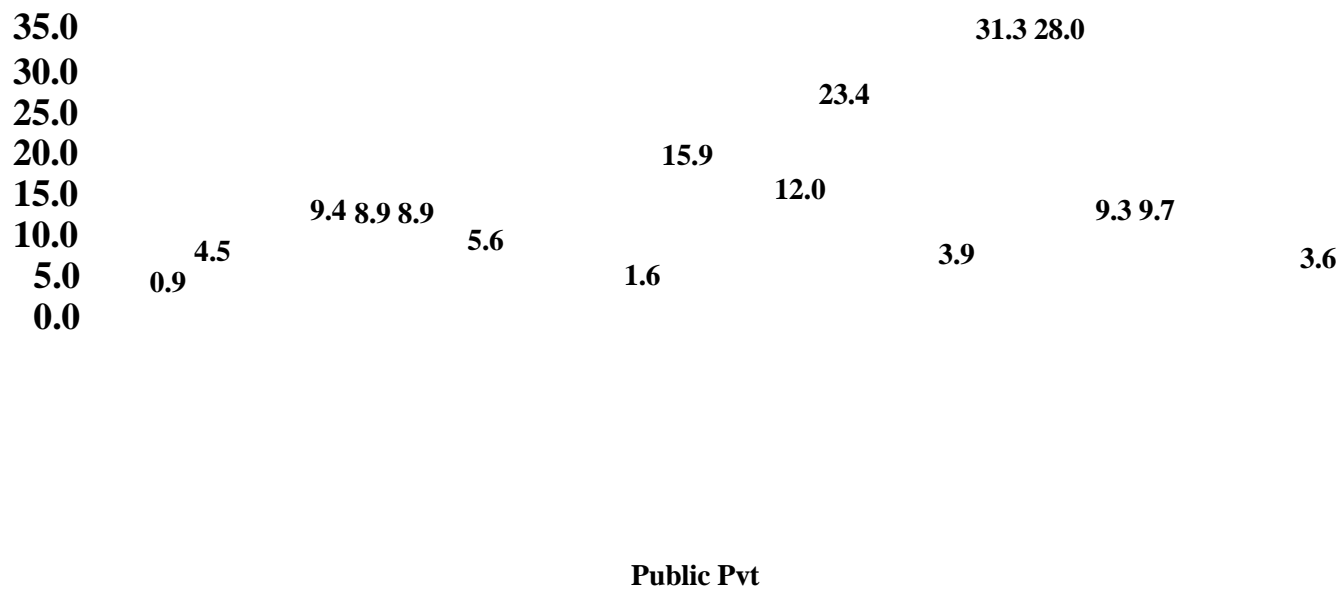


Figure 18: Percentwise distribution of c section deliveries of districts in Marathwada, 2013-14

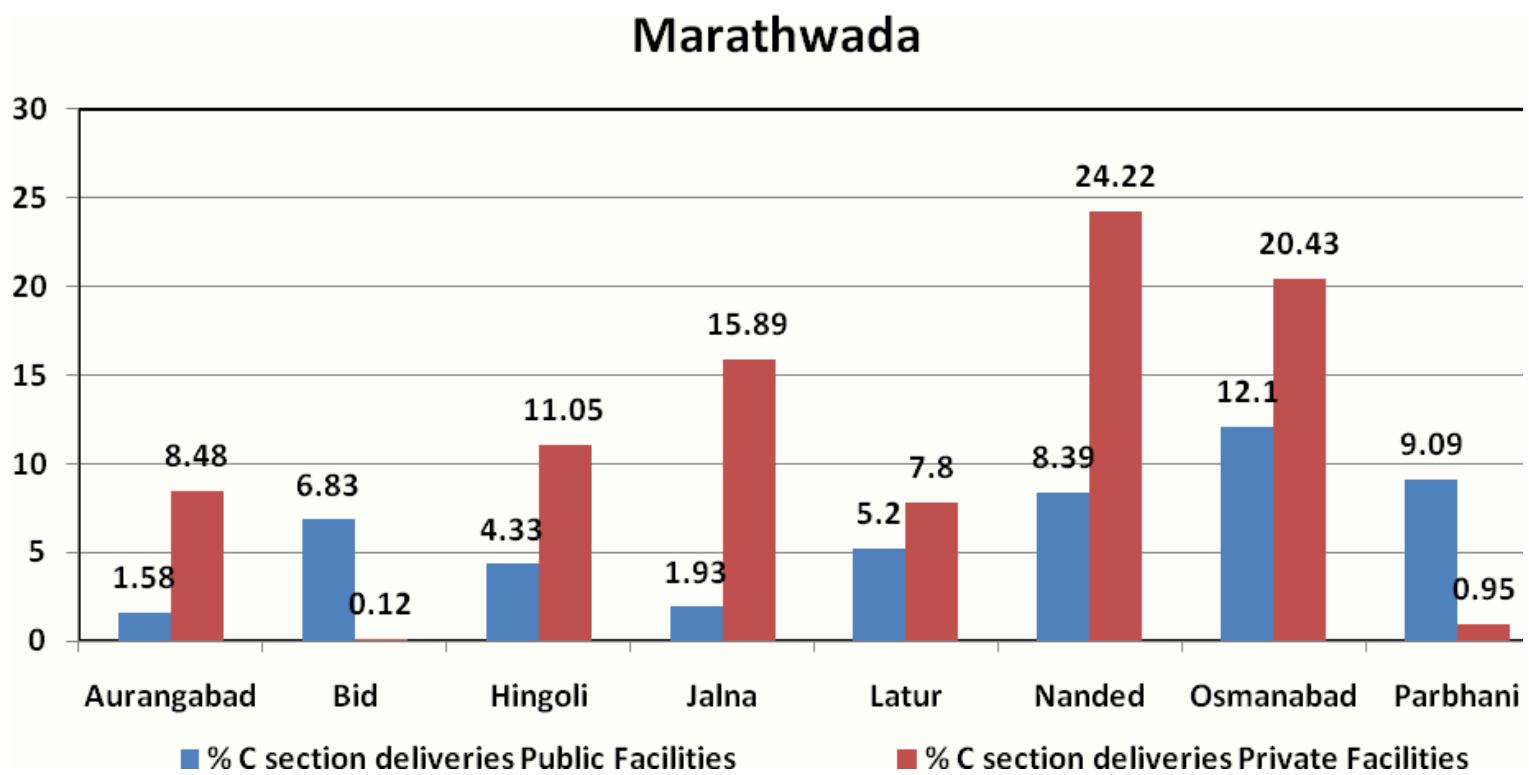
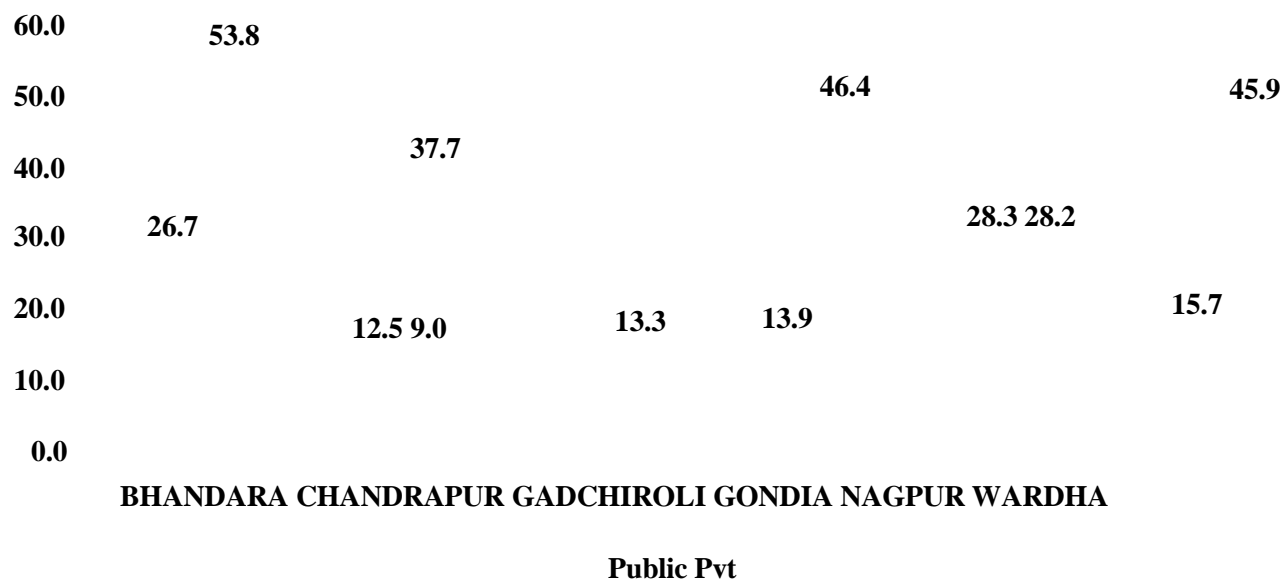


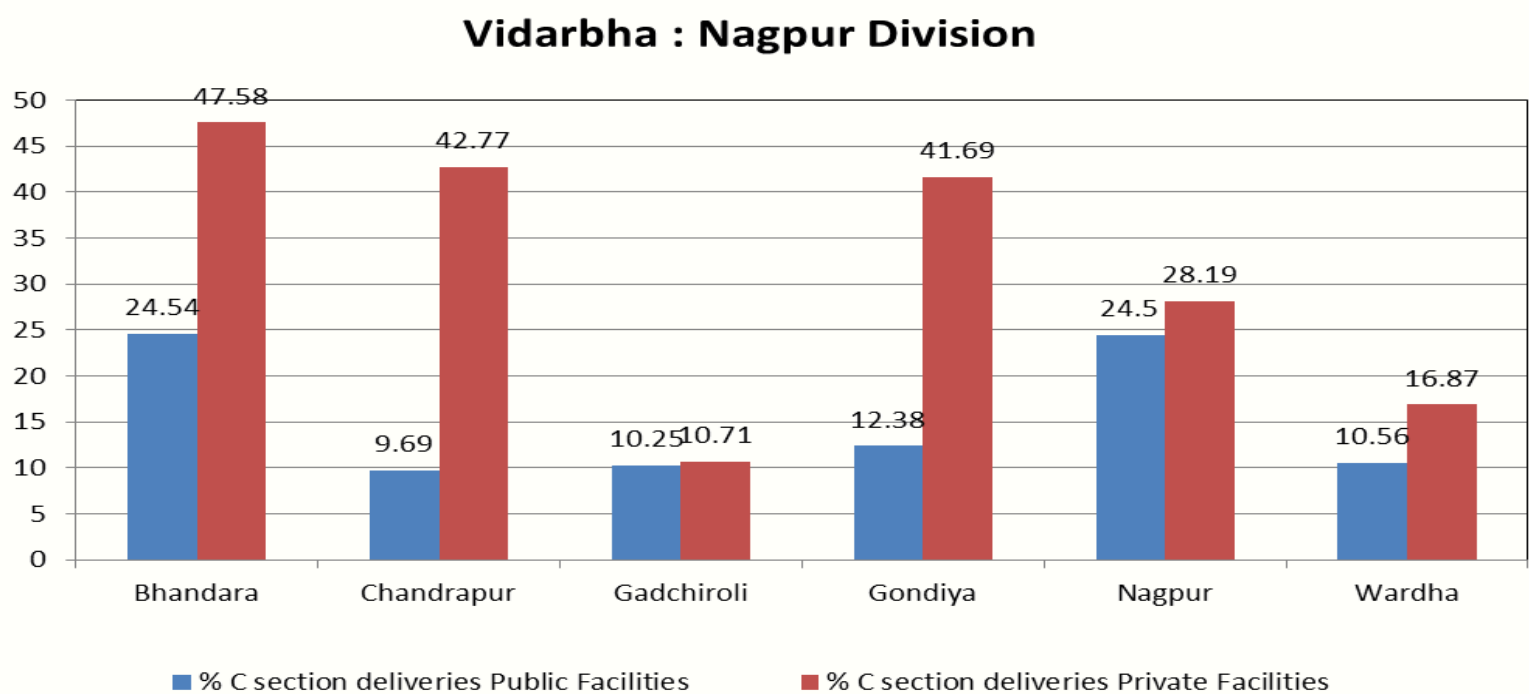
Figure 17 & 18 depicts change in c section deliveries was not uniform in Marathwada region. Increase in c section deliveries from 2013-14 to 2014-15 was observed in districts of Latur, Nanded, Osmanabad and Parbhani districts. The increase was prominent in latur district where the increase in c section deliveries was more than twice in public health institutions and thrice in private institutions. Private c section deliveries was higher than public institution c section deliveries in all the district and

in both the years except in Parbhani district. In Parbhani district c section deliveries in public health institutions was greater than private health institutions.

**Figure 19: Percentwise distribution of c section deliveries of districts in Vidarbha-Nagpur, 2014-15**



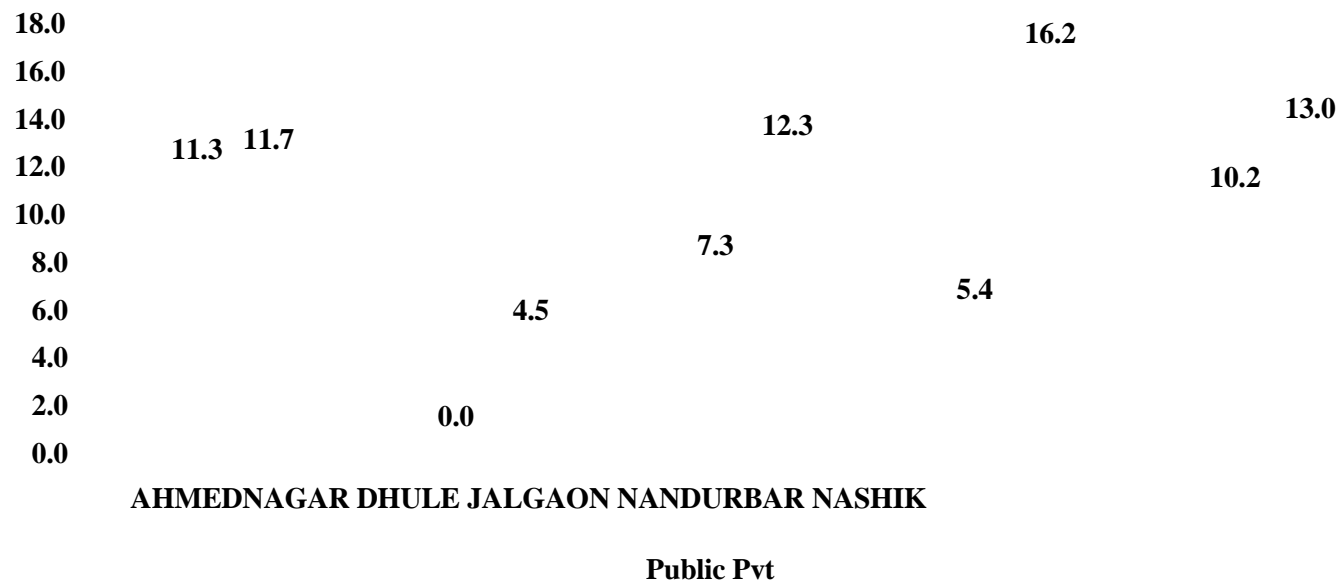
**Figure 20: Percentwise distribution of c section deliveries of districts in Vidarbha-Nagpur, 2013-14**



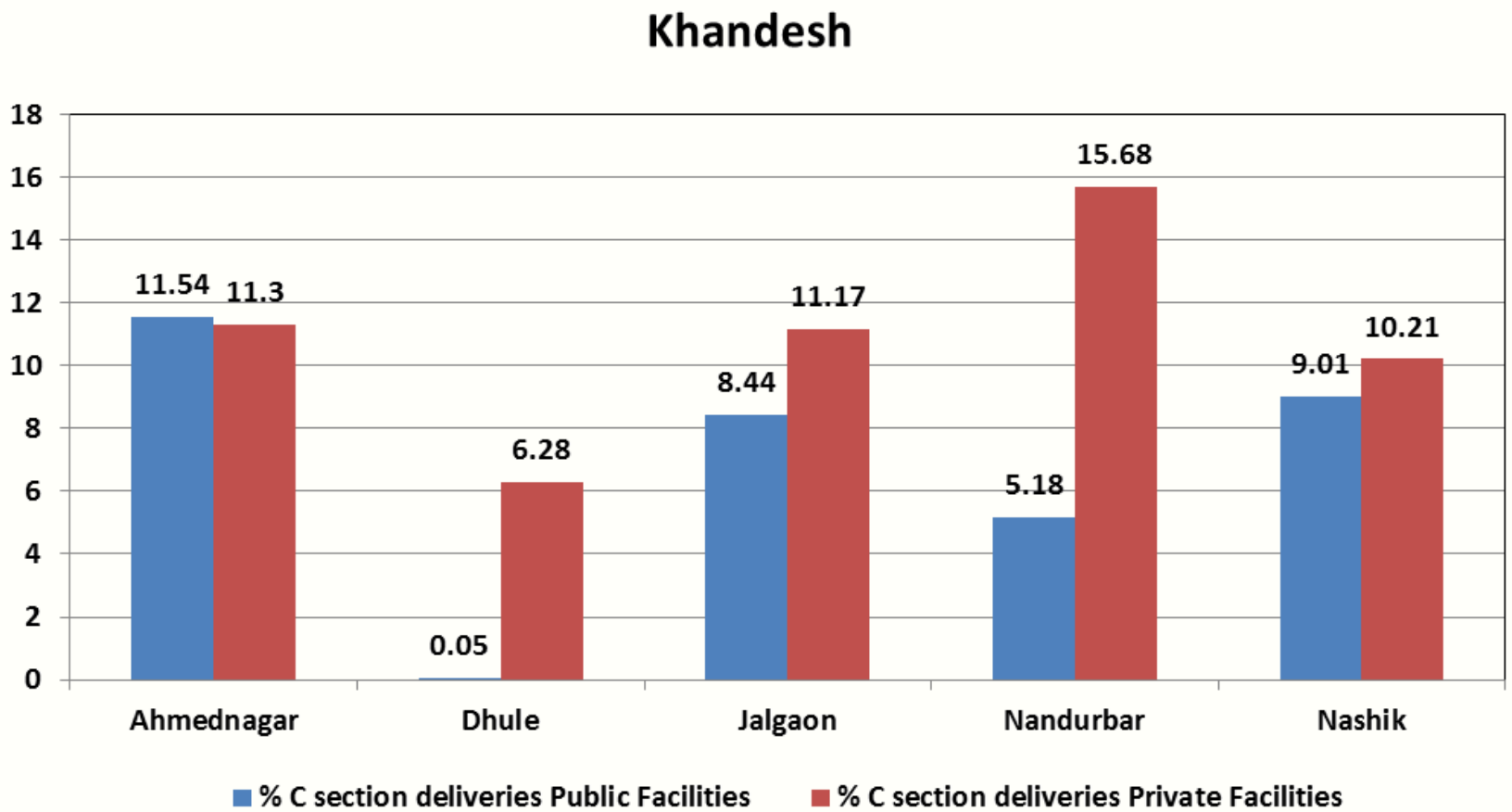
As observed in Figure 19 and 20 In Vidarbha Nagpur division c section deliveries increased in both public and private institution from 2013-14 to 2014-15 in all the districts. However, the increase was more than twice in private health institutions in Wardha district. C section deliveries in Vidarbha-Nagpur division was mainly concentrated in Bhandara, Chandrapur and Gondia districts. Private c section deliveries was higher than public c section deliveries in all the districts whereas in Nagpur

district the percentage of c section deliveries was more or less same in both public and private institutions.

**Figure 20: Percentwise distribution of c section deliveries of districts in Kandesh, 2014-15**



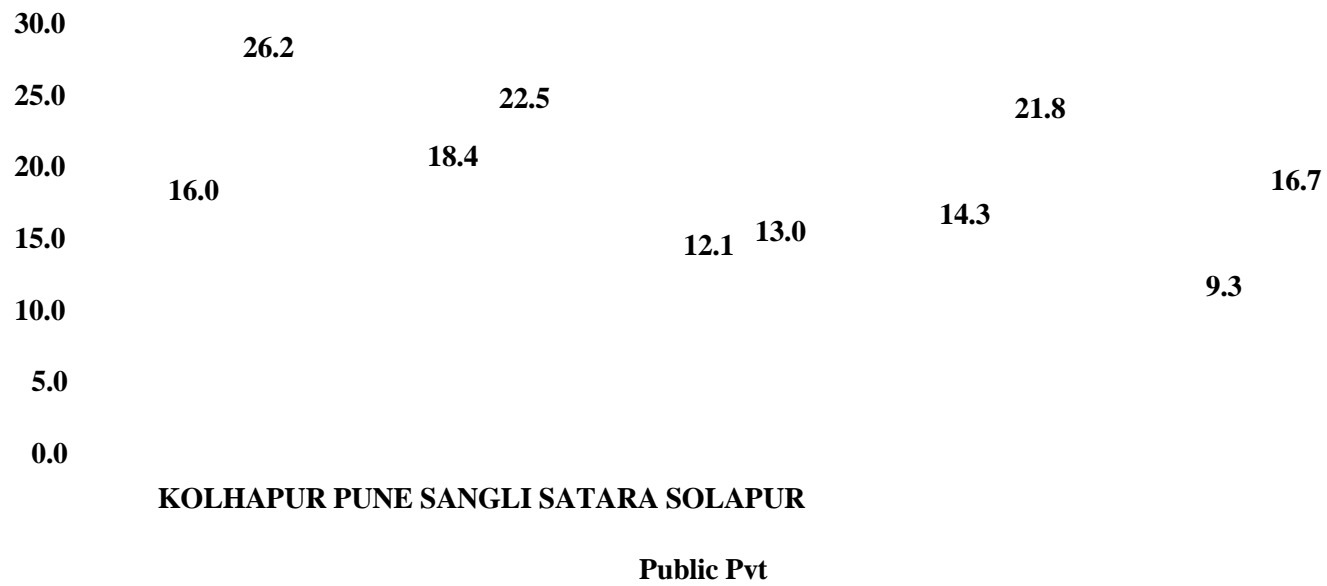
**Figure 21: Percentwise distribution of c section deliveries of districts in Kandesh, 2013-14**



Khandesh region as depicted in Figure 20 and 21 in general shows low c section deliveries in both the years. In Khandesh region there was not much change in c section deliveries in both public and private

institution with private c section deliveries higher than public institution csection deliveries. However zero cases were reported in public institutional c section deliveries in Dhule district.

**Figure 22: Percentwise distribution of c section deliveries of districts in Dsh-Pune, 2014-15**



**Figure 23: Percentwise distribution of c section deliveries of districts in Kandesh, 2013-14**

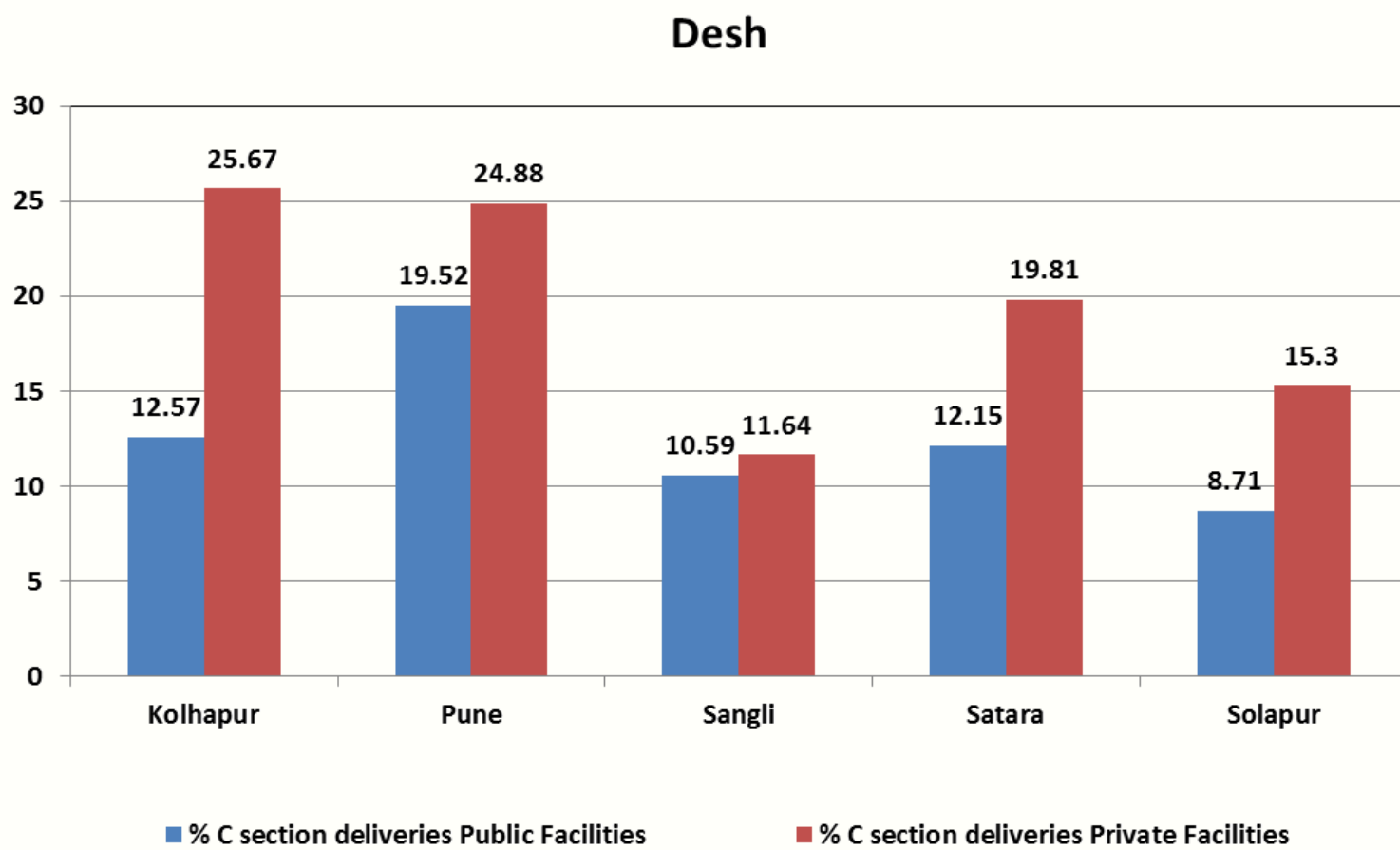


Figure 22 and 23 presents c section deliveries in desh region as seen in above figures there was a marginal rise in c section deliveries which was mainly concentrated in Kolhapur and Pune districts. Private c section deliveries was higher than public institution c section deliveries.

## 6. Obstetric Complications and Treatments

Obstetric Complicated cases are more likely to have c section deliveries. HMIS data provided Obstetric complicated cases in both public and private institutions as well as type of treatment provided to total obstetric complicated patients.

The single most important risk factor for postpartum maternal infection is Caesarean section. Women having Caesarean section have a greater risk of infection than women having normal delivery. Generally women undergoing Caesarean section receives antibiotic treatment.

The use of oxytocis for the prevention of PPH during the third stage of labour is recommended for all births. To examine if any linkages between obstetric complications and c section deliveries we compare the number of cases of total c section deliveries with type of treatment given such as provided with antibiotics and oxytocis to obstetric complicated cases in top and bottom 5 districts of Maharashtra with c section deliveries.

**Figure 24: Number of C-section deliveries, and obstetric complicated cases with treatment of IV antibiotics and IV Oxytocic in top 5 districts, 2014-15**

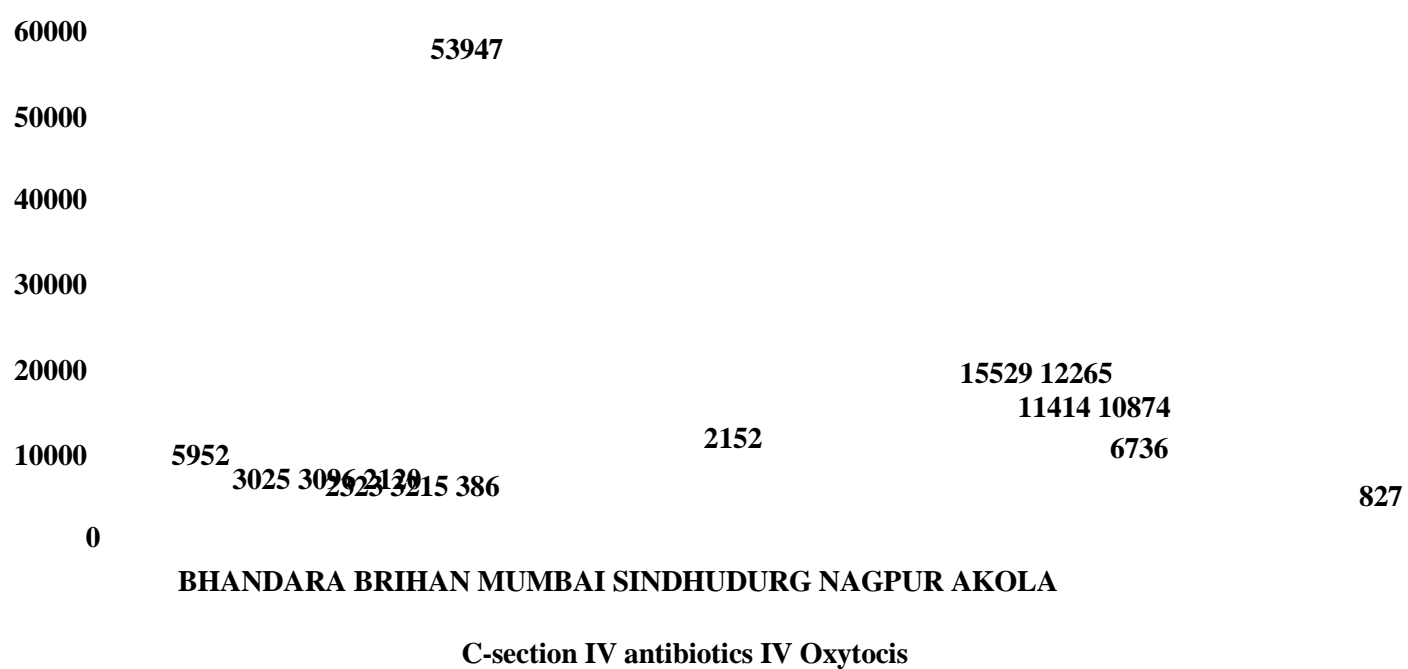


Figure 24 depicts districts which are in top five in terms of c section deliveries and their respective number of obstetric complicated cases treated with oxytocis and antibiotics. As observed in the above figure equivalently cases of c section deliveries are provided with antibiotics and oxytocis in all the districts except in Brihanmumbai district. This supports the evidence of high c section deliveries in all the districts. However, in Mumbai district the number of c section deliveries are almost 20 times higher than the number of obstetric complicated cases provided with treatment of antibiotics and oxytocis. This reflects either non reporting or underreporting of treatment provided to obstetric complicated cases or unnecessary c section deliveries.

**Figure 25: Number of C-section deliveries, and obstetric complicated cases with treatment of IV antibiotics and IV Oxytocic in bottom 5 districts, 2014-15**

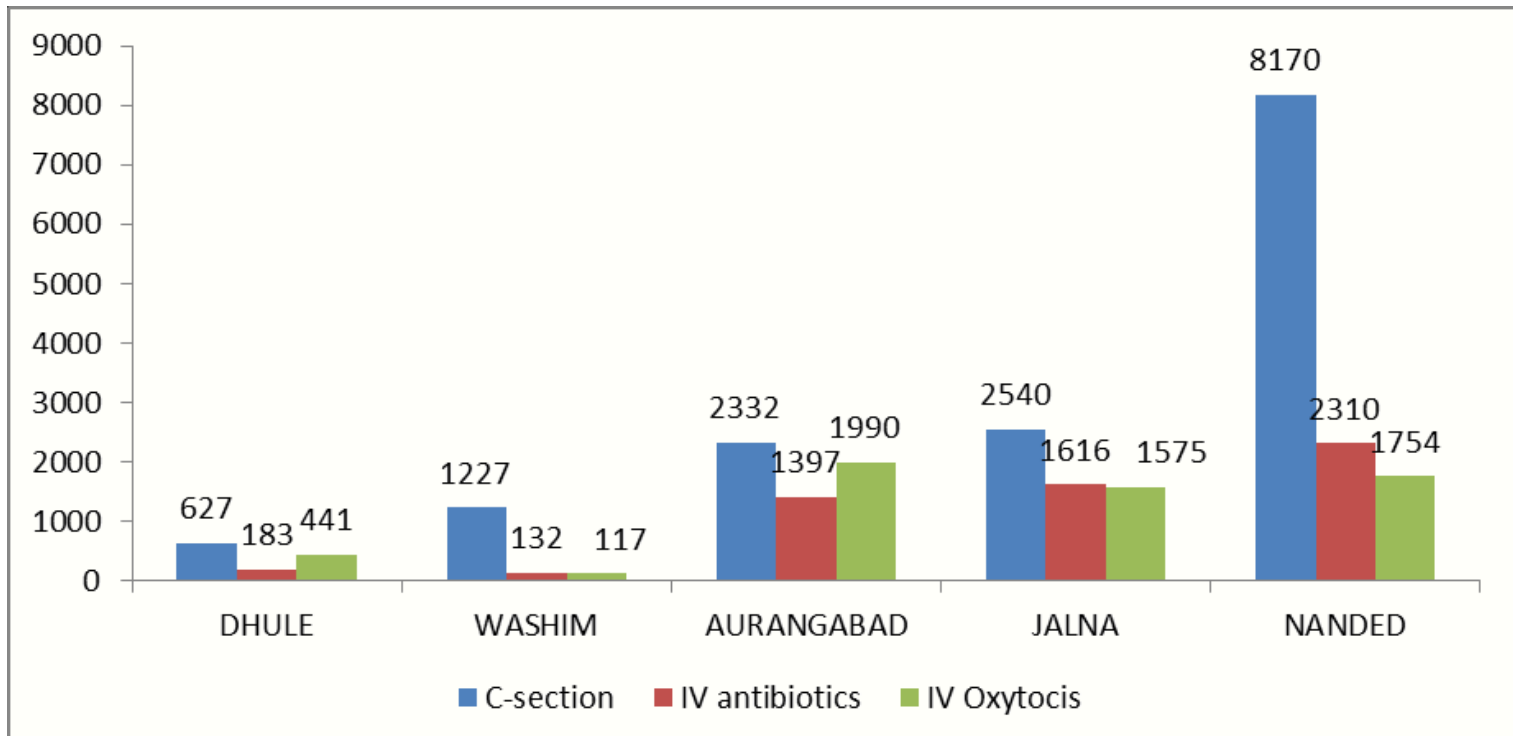
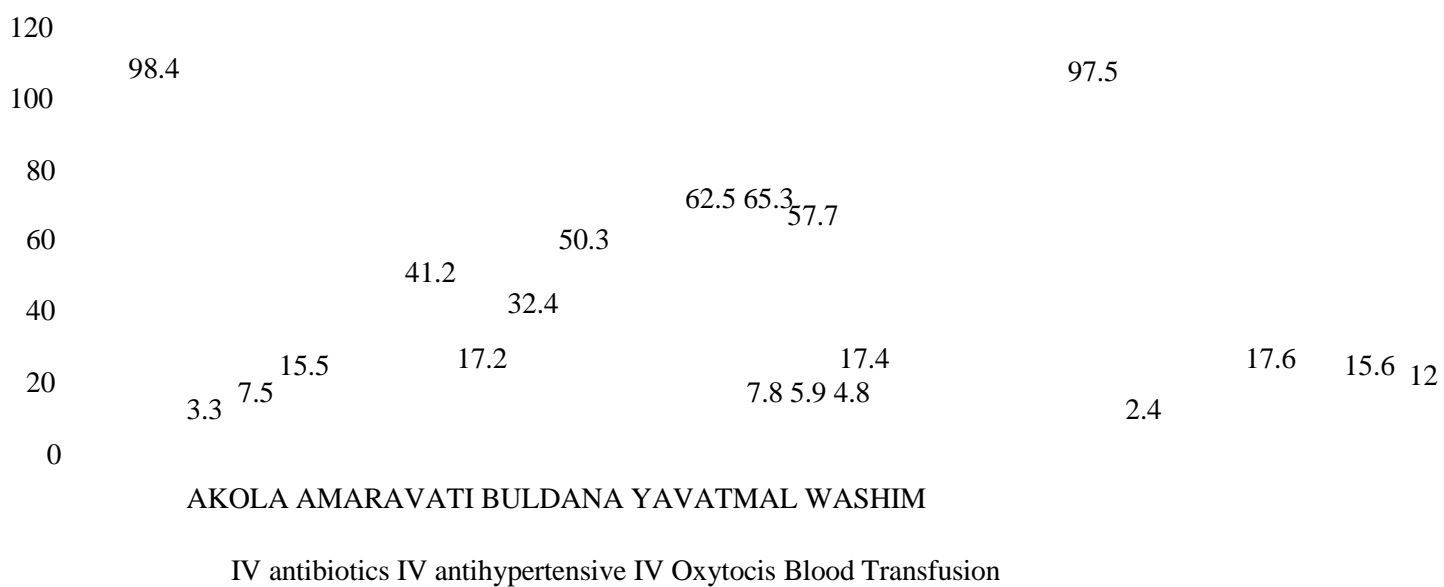


Figure 25 depicts districts which are in bottom five in terms of c section deliveries and their respective number of obstetric complicated cases treated with oxytocis and antibiotics. As observed in the above figure equivalently cases of c section deliveries are provided with antibiotics and oxytocis in all the districts except in Nanded and Washim districts. This supports the evidence of high c section deliveries in all the districts. However, in Nanded and Washim district the number of c section deliveries are almost 4 times and 10 times higher respectively than the number of obstetric complicated cases provided with treatment of antibiotics and oxytocis. This reflects either non reporting or underreporting of treatment provided to obstetric complicated cases or unnecessary c section deliveries.

#### 6. Regionwise type of treatment provided to Obstetric Complicated cases, 2014-15

**Figure 26 Percentwise type of treatment provided to Obstetric Complicated cases in Vidharbha-Amravati, 2014-15**



As observed above in Figure 26 In Akola almost all the obstetric complicated cases were provided with antibiotics whereas in Amravti district nearly half of the obstetric complicated cases (50.3%) required blood transfusion and 41 % were treated with antibiotics , followed by 32% of cases treated with Oxytocis. Eventough, districts of Buldhana, Washim and Yavatmal shows less than 15% of c section deliveries in private institutions more than half of the obstetric complicated cases (57%) in Buldana district and almost all the cases in Yavatmal district (97%) were treated with Oxytocis.

**Figure 27 Percentwise type of treatment provided to Obstetric Complicated cases in Marathwada, 2014-15**

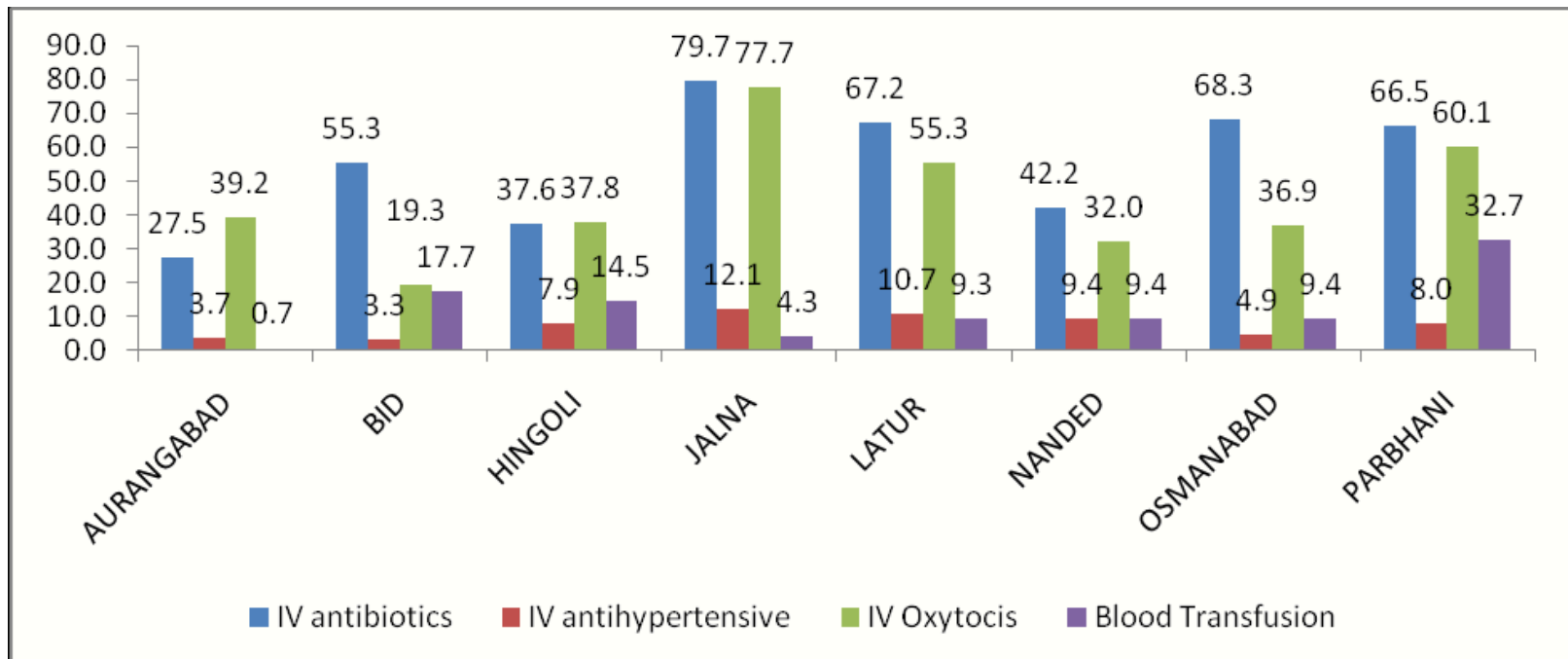
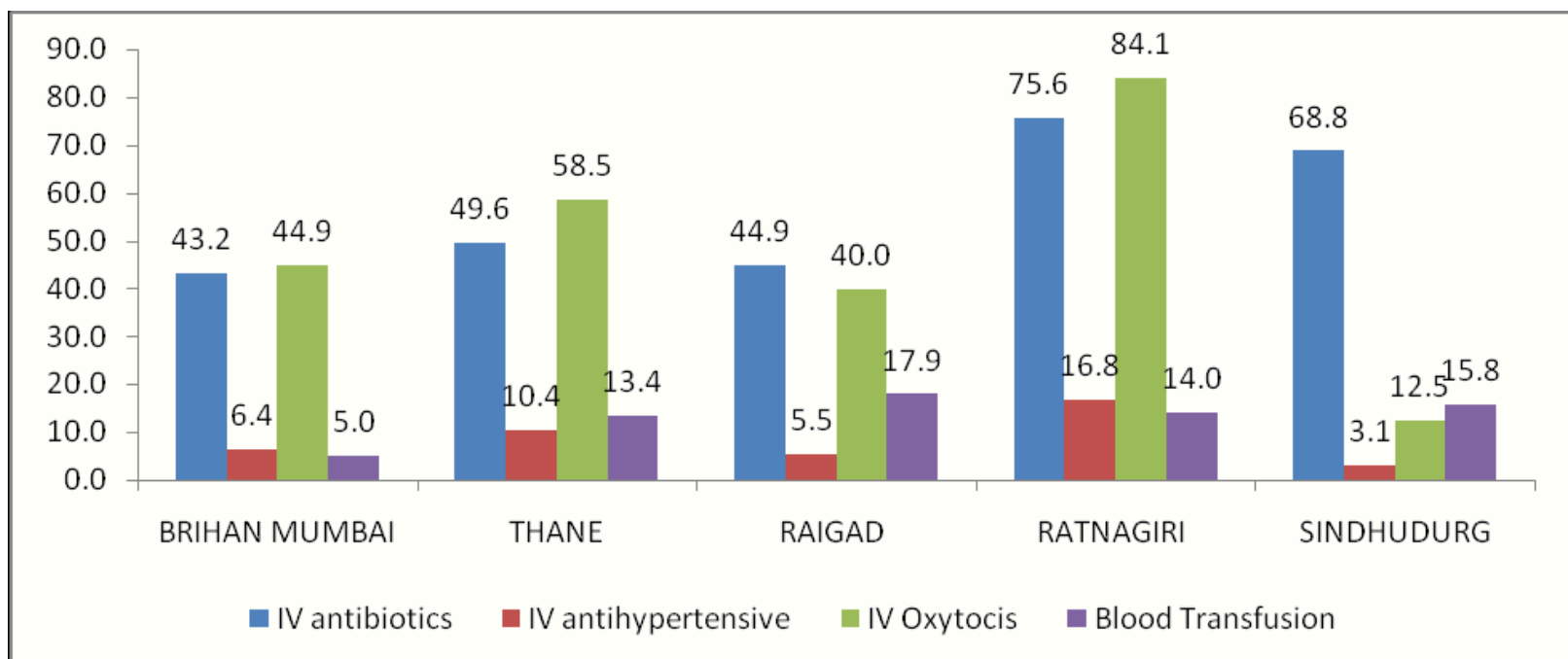


Figure 27 depicts In marathwada region shows treatment mainly given to obstetric complicated cases was antibiotics and oxytocis. Treatment given to obstetric complicated cases using antibiotics was higher in districts of Bid, Latur, Osmanabad . Whereas in Jalna and Parbhani distriocets treatment by both Oxytocis and antibiotics was high.

**Figure 28 Percentwise type of treatment provided to Obstetric Complicated cases in Konkan, 2014-15**





In Konkan region treatment by providing oxytocis was slightly higher than treatment provided by antibiotics in all the districts of the region except in sindudurg where the treatment provided was mainly antibiotics as depicted in Figure 28. Notably c section deliveries was higher in public health institutions as compared to private health institutions. In the region Thane, Brihanmumbai and Sindudurg had high c section deliveries.

**Figure 29 Percentwise type of treatment provided to Obstetric Complicated cases in Vidarbha-Nagpur, 2014-15**

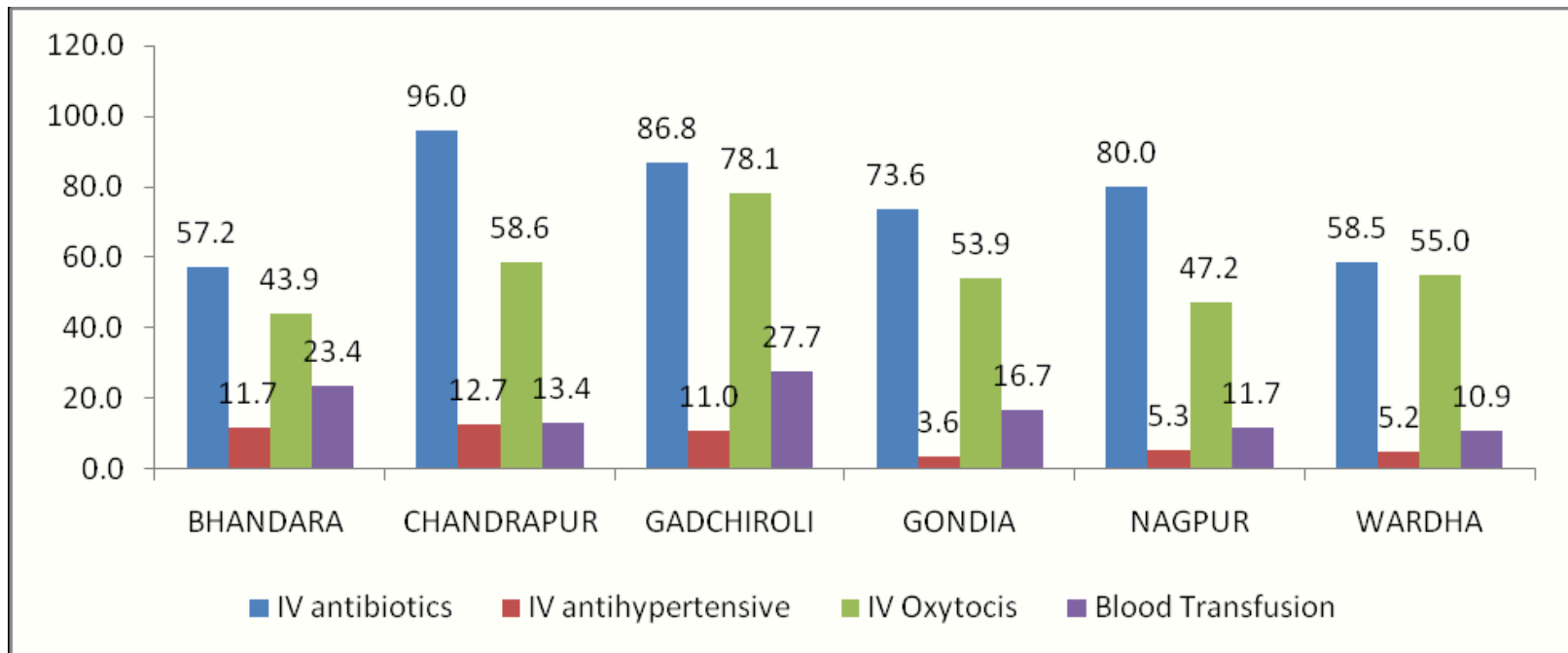


Figure 29 shows type of treatment provided to obstetric complicated cases in region of Vidarbha – Nagpur region. In Bhandara, Chandrapur and Gondiya districts c section deliveries was more than 40% in private health institutions. Among these districts treatment provided by antibiotics was much greater than treatment provided by oxytocis. In chandrapur district 96 percent of obstetric complicated cases were treated with antibiotics indicating high c section deliveries.

**Figure 30 Percentwise type of treatment provided to Obstetric Complicated cases in Kandesh, 2014-15**

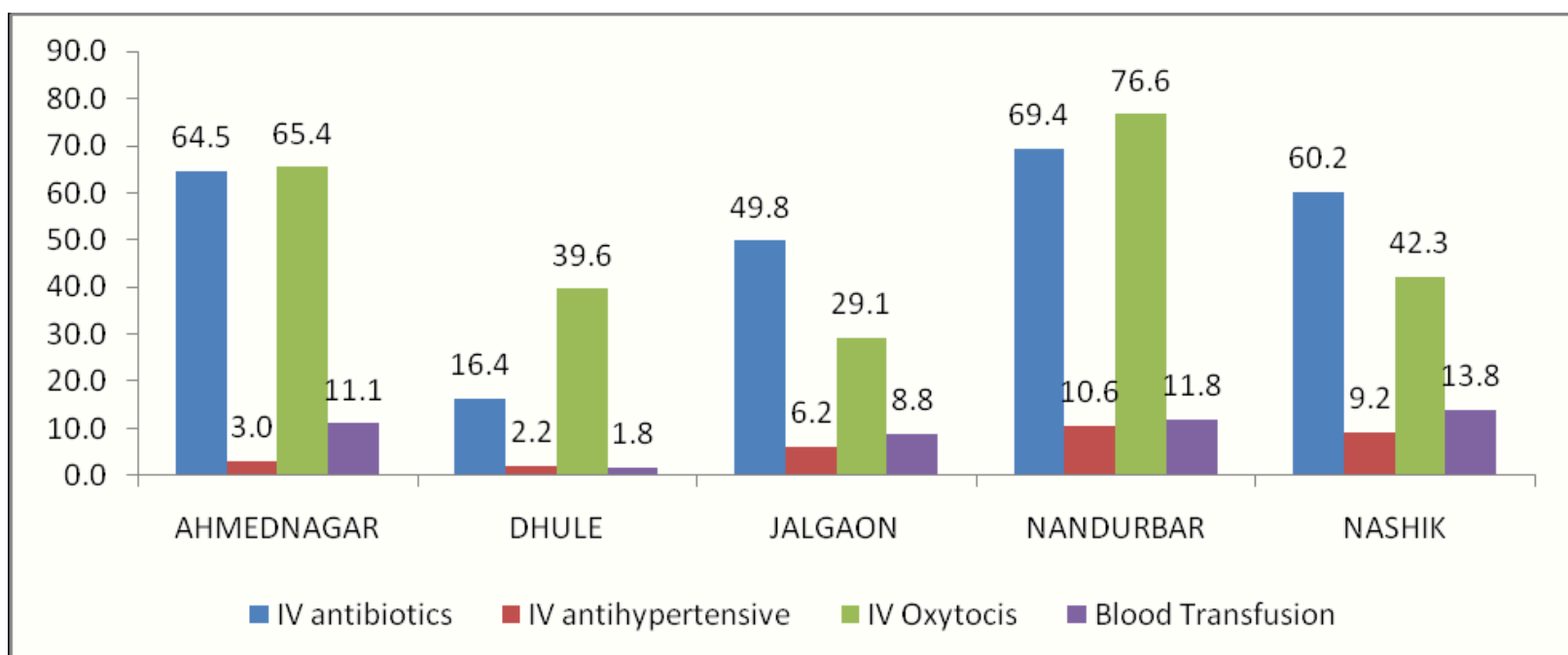
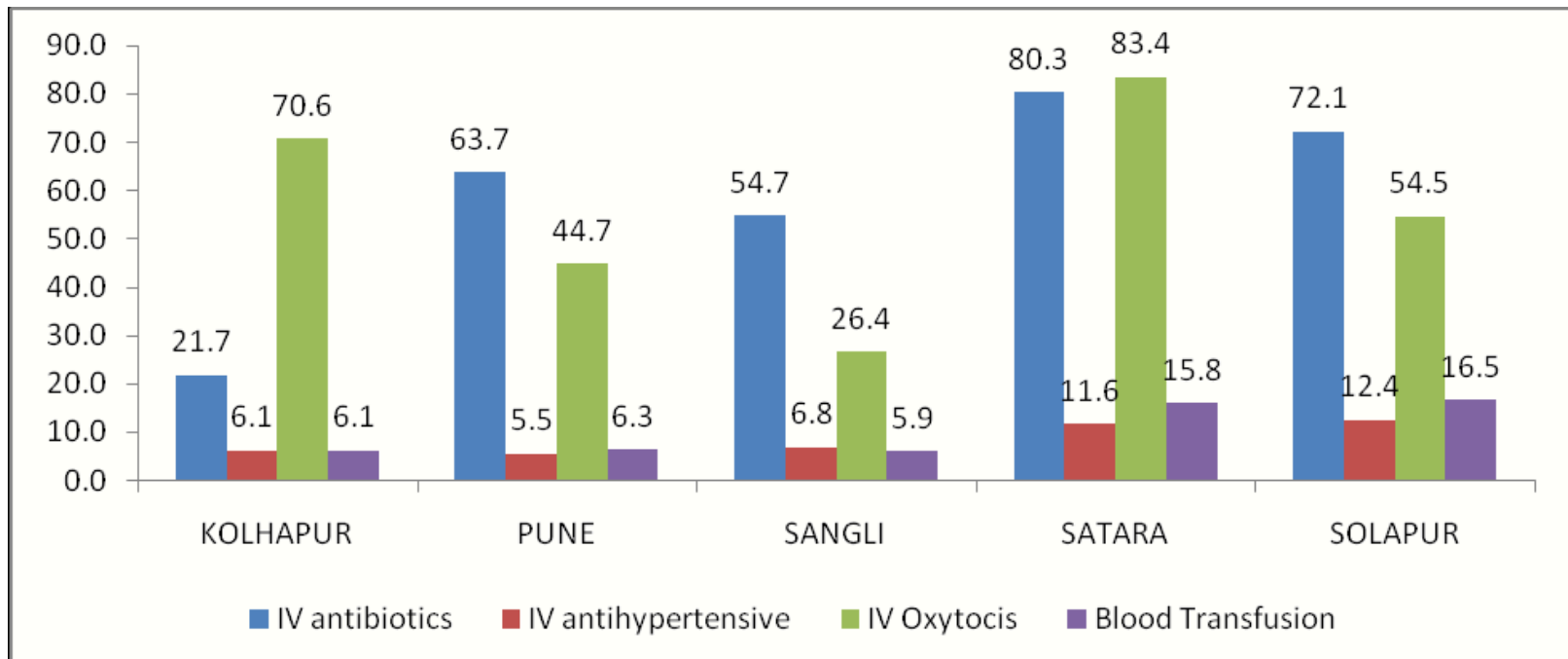


Figure 30 shows Khandesh region in general shows low c section deliveries and in dhule districts c section deliveries was almost negligible whereas private c section deliveries was less than 6 percent. In spite of this 39% of obstetric complicated cases were treated with oxytocis, which indicates underreporting of c section deliveries in dhule district. In all the other districts as observed in other regions treatment provided by antibiotics and oxytocis was higher than other types of treatment provided for obstetric complications.

**Figure 31: Percentwise type of treatment provided to Obstetric Complicated cases in Desh, 2014-15**



Except for c section deliveries in private institutions in Kolhapur and Pune district the c section deliveries was less than 20 percent in rest of the districts. Figure 31 shows treatment provided to obstetric complications by giving antibiotics and oxytocis was same in satara district. Treatment provided to obstetric complications by giving oxytocis was higher in kolhapur district and treatment provided by giving antibiotics was high in Pune district.

In general treatment given to obstetric complicated cases was mainly antibiotics and oxytocis. Region of Vidarbha –Nagpur in Bhandara, Chandrapur and Gondiya districts c section deliveries was more than 40% in private institutions. Among these districts treatment provided by antibiotics was much greater than treatment provided by oxytocis. In Chandrapur district 96 percent of obstetric complicated cases were treated with antibiotics indicating high c section deliveries. Khandesh region in general shows low c section deliveries and in Dhule districts c section deliveries was almost negligible whereas private c section deliveries was less than 6 percent.

**7. Relative risk C section deliveries and Obstetric Complications in Public to Private Institutions**

Further, we analyse the **relative risk ratio (RR)** to examine the ratio of the probability of c section deliveries occurring in public health institution to the probability of the c section deliveries in private health institutions. Similarly the relative risk ratio is used to examine the ratio of the probability of obstetric complications cases attended in public health institution to the probability of the obstetric complications attended in a comparison, to private health institutions

Here for example c section deliveries by type of institutions

**C section deliveries    Normal deliveries    Total**

<b>Public Institutions</b>	<b>C</b>	<b>N</b>	<b>T</b>	
	<sub>11</sub>		<sub>12</sub>	<sub>1i</sub>
<b>Private Institutions</b>	<b>C</b>	<b>N</b>	<b>T</b>	
	<sub>21</sub>		<sub>22</sub>	<sub>2i</sub>
<b>Total</b>	<b>T</b>	<b>T</b>	<b>T</b>	
		<sub>i1</sub>	<sub>i2</sub>	

**Relative risks of c section deliveries in public health institutions to private health =  $(C_{11}/T_{1i}) / (C_{21}/T_{2i})$**

Here for example obstetric complicated cases attended by type of institutions

<b>Obstetric complicated</b>		<b>Non obstetric</b>	<b>Total</b>
	<b>cases</b>	<b>complicated cases</b>	
<b>Public Institutions</b>	<b>O</b>	<b>T</b>	
	<sub>11</sub>	<sub>12</sub>	<sub>1i</sub>
<b>Private Institutions</b>	<b>O</b>	<b>T</b>	
	<sub>21</sub>	<sub>22</sub>	<sub>2i</sub>
<b>Total</b>	<b>T</b>	<b>T</b>	
		<sub>i1</sub>	<sub>i2</sub>

**Relative risks of c section deliveries in public health institutions to private health =  $(O_{11}/T_{1i}) / (O_{21}/T_{2i})$**

Table 1 shows the relative risk of obstetric complications in public health institutions to private health institutions of the total deliveries and the risk of c section deliveries in public health institution to private health institutions.

**Table1: Relative ratios of Obstetric to non Obstetric cases and C section to normal deliveries in public and Private Institutions of Maharashtra, 2014-15**

**Districts Relative ratio**

	Relative ratio									Remark
	Obstetric cases attended in public to private	Obstetric cases to non obstetric attended in public institutions	C section public to private	C section to normal delivery in public institutions						
<b>Vidarbha- Amravati</b>										
<b>Akola</b>	7.9	1.6	1.0	1.0	Zero cases of obstetric complication					attended in private institution in the month of July
<b>Amravati</b>	12.1	1.5	0.3	0.4	Zero cases of Obstetric complication					attended in private institution from August to November and February and March.
<b>Buldana</b>	6.0	3.1	0.5	0.6						
<b>Washim</b>	1.1	1.0	0.0	0.1	1. Zero cases of obstetric complication					attended in private institution in April and January 2. Zero cases of c section deliveries in public institution from June to August
<b>Yavatmal</b>	0.2	0.7	0.4	0.6	--					
<b>Marathwada</b>										
<b>Aurangabad</b>	1.4	1.19	0.19	0.30	Underreporting of obstetric complication					attended in private institution in the month of August
<b>Bid</b>	3.7	1.6	1.0	1.0	1. Zero cases of obstetric complication					attended in private institution from April to June and in the months of August and November 2. Underreporting of obstetric complication attended in public institution in month of April and May
<b>Hingoli</b>	47.1	1.5	0.6	0.8	1. Underreporting of obstetric complication					attended in private institution from April to May and zero cases reported in rest of the months 2. Only one case of C section deliveries in public institution in April.
<b>Jalna</b>	59.1	6.4	0.9	0.9	Underreporting of obstetric complication					attended in private institution August to March and zero cases in the month of July.
<b>Latur</b>	3.0	1.3	0.5	0.7	--					
<b>Nanded</b>	21.9	1.7	0.6	0.6	1. Underreporting of obstetric complication					attended in private institution from April to May and zero

cases from September to November  
2. Underreporting of C section deliveries in public institution from August to March.

**Osmanabad** 0.7 0.8 0.3 0.5 --  
**Parbhani** -- 1.3 2.6 1.1 1. Zero cases of obstetric complication

reported in private institution in all the months.  
2. Underreporting of obstetric complication attended in public institution in months of April and May

#### Vidarbha-Nagpur

**Chandrapur** 1.3 1.09 0.3 0.5 1. Underreporting of obstetric

complication attended in public institution in month of April and May  
2. Underreporting of obstetric complication attended in private institution from September to March

**Bhandara** 0.7 0.9 0.4 0.8 Underreporting of obstetric

complication attended in private institution in month of January and May and zero cases in the months of October and March

**Gadchiroli** -- 1.0 0.6 0.9 1. Zero cases of obstetric complication

attended in private institution in all the months.  
2. C section deliveries underreported and zero cases reported from September to December and in the month of July.

**Gondia** -- 1.1 0.2 0.7 Zero cases of obstetric complication

attended in private institution in all the months

**Nagpur** 14.5 3.3 0.5 0.7 --  
**Wardha** 0.3 0.7 0.3 0.6 --

#### Konkan

**Thane** 3.2 1.7 0.3 0.4 --  
**Brihanmumbai** 0.4 0.6 0.6 0.6 Zero cases of obstetric complication

attended in private institution and underreporting in public institution in the month of September

**Raigad** 1.2 1.0 0.9 0.9 --  
**Sindudurg** 0.4 0.8 1.6 1.2 --  
**Ratnagiri** 6.8 1.6 0.8 0.9 Underreporting of obstetric

complication attended in private institution and zero cases in the months of April, November and March

#### Khandesh

<b>Dhule</b>	2.4	1.8	0.0	0.0	C section deliveries in public	institutions are either zero or one case in all the months.
<b>Ahmednagar</b>	1.7	1.4	0.9	0.9	Underreporting of obstetric	complication attended in private institution in month of March
<b>Nandurbar</b>	6.5	1.1	0.3	0.7	Underreporting of obstetric	complication attended in private institution and zero cases in April, May, November and March
<b>Jalgaon</b>	2.7	1.7	0.5	0.6	1. Underreporting of obstetric	complication attended in private institution in month of July. 2. Underreporting of csection in public institution in month of March
<b>Nasik</b>	0.3	0.8	0.7	0.9	--	
<b>Desh-Pune</b>						
<b>Kolhapur</b>	8.6	1.2	0.6	0.6	Except in the months of April, May, August and December obstetric complication is underreported rest of the months zero cases	
<b>Sangli</b>	0.9	0.9	0.9	0.9	--	
<b>Satara</b>	1.0	1.0	0.9	0.9	Underreporting of obstetric	complication attended in private institution and zero cases in September, January and February
<b>Pune</b>	4.1	2.2	0.8	0.8	--	
<b>Solapur</b>	1.3	1.1	0.5	0.6	--	

Source: Unit data of HMIS, MOHFW, 2014-15

In general Obstetric complicated cases attended in public health institutions was relatively higher than private health institutions in all the districts except in Sangli, Nasik, Brihanmumbai, Wardha, Bhandara, Osmanabad, Sindudurg and Yavatmal districts. *Obstetric complicated cases in Bhandara district is underreported in the month of January and May and zero cases reported in the months of October and March. Relatively, obstetric complicated cases were higher than non obstetric complicated cases in public institutions in these districts.*

*Regionwise, obstetric complicated cases attended in public institution was relatively higher in Vidarbha and marathwada regions and were mainly concentrated in Hingoli, jalna, Amravati, Nagpur and Akola districts reflecting access to treatment of obstetric complicated cases. Except in Nagpur district all the other districts reported underreporting of obstetric complicated cases in private institution. Further, relatively Obstetric complicated cases to non obstetric complicated cases was highest in Jalna district.*

C section deliveries was higher in private institution than in public institution in all the districts except in Akola, Bid, Parbhani and Sindudurg districts. In Akola and bid districts relative ratio of c section deliveries to non c section deliveries were almost same in public and private institutions. Both these districts shows underreporting of obstetric complicated cases in private institution. In Parbhani district obstetric complicated cases in private institution were reported as zero in all the months. *There seems to be either under utilization of health service or underreporting from private institution in Parbhani district.*

*Consequently Normal deliveries are higher than c section deliveries in these districts. In Gondia and Aurangabad districts relatively csection deliveries was much higher in private institution than in public institutions. However, there were zero cases obstetric complicated cases in private institution in Gondia district and underreporting in Aurangabad district. In Dhule district c section deliveries in public institution was either reported as 1 or 0 cases.*

*Overall Obsteric complicated cases in private institution are either underreported or not reported. Interestingly, c section deliveries in these private institution are relatively higher than in public institutions.*

### **8. Summary and Conclusion**

C section deliveries in general was high in vidarbha region of Maharashtra and in particular in Bhandara, Akola, Amravati and Nagpur districts in both public and private institutions. Availability of WH in Amravati, Akola and Gondia districts consequently reflected in more than 30 percent of c section deliveries. Bhandara district in particular shows more than quarter deliveries in public institutions and in particular DH with more than half of the deliveries as c section deliveries. More than half of the deliveries were c section in private institutions in Bhandara district. In Konkan region Brihanmumbai and Thane districts shows more than quarter of the deliveries as c section deliveries this is well above the 15-20% c section deliveries recommended by WHO.

Trend analysis comparing c section deliveries of 2013-14 and 2014-15 shows more or less the same pattern in c section deliveries.

Cross examination with obstetric complications cases with c section deliveries was made to find if any linkages. In general the obstetric complications cases by type of treatment shows high percent of treatment given as antibiotics and oxytocis which are the prescribed and recommended treatment by WHO for c section deliveries. Onlu Latur district with more than 50% of obstetric complications attended were treated with blood transfusion.

Relative risk ratio analysis was carried out in all the districts of Maharashtra shows in general Obstetric complicated cases attended in public institution was higher than private institutions in all the districts except in the districts of Sangli, Nasik, Brihanmumbai, Wardha, Bhandara, Osmanabad, Sindudurg and Yavatmal. Although *obstetric complicated cases was underreported in Bhandara district it needs to be probed why c section deliveries are high in private institution eventhough the obstetric complications attended in private institution are lower than public institutions.*

*Regionwise, obstetric complicated cases attended in public institution was higher in Vidarbha and Marathwada regions and were mainly concentrated in Hingoli, Jalna, Amravati, Nagpur and Akola districts reflecting availability of treatment for obstetric complications.*

C section deliveries was higher in private institution than in public institution in all the districts except in Akola, Bid, Parbhani and Sindudurg districts. In Akola and Bid districts relative ratio of c section deliveries to non c section deliveries were almost same in public and private institutions. However, both these districts shows underreporting of obstetric complicated cases in private institution. *There seems to be either under utilization or underreporting from private institution in Parbhani district.*

*In Gondia and Aurangabad districts relatively csection deliveries was much higher in private institution than in public institutions. However, there were zero cases of obstetric complications in private institution in Gondia district and underreporting in Aurangabad district. In Dhule district c section deliveries in public institution was either reported as 1 or 0 cases.*

*Overall Obsteric complicated cases in private institution are either underreported or not reported. Interestingly, c section deliveries in these private institution are relatively higher than in public institutions.*

### **References**

1. Mishra, U S , Ramanathan M (2002) "Delivery-related complications and determinants of caesarean section rates in India" Health Policy and Planning, 17(1):90-98.
2. WHO. 1994. Indicators to Monitor Maternal Health Goals. Report of a Technical Working Group, Geneva, 8-12 Nov, 1993
3. World Health Organization, UNFP , UNICEF and MDD (2009) "Monitoring Emergency Obstetric Care a Handbook", WHO, Geneva.