



Review Paper

# Factors influencing maternal health indicators among tribal population in Maharashtra (India) with special focus on five high priority districts

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## Abstract

Although National Rural Health Mission (NRHM) has been ushering the public health scenario of India, five high priority districts (HPDs) which are tribal in nature in Maharashtra show poor composite index in terms of maternal health indicators. To find out the determinants influencing maternal health indicators among tribal population in five HPDs, various secondary data sources on the five HPDs in Maharashtra were reviewed. The available data suggest that six levels of determinants such as individual characteristics, family structure, community profile, availability, and accessibility of health infrastructure and facilities, district profile, and the governance issues, are influencing the maternal health Indicators. Coordinated efforts are required for developing resources and agencies for the empowerment of this population in the long run. Tailor-made programmes to influence the health seeking behaviour of tribal mothers will play an important role and will bring about improvement in the maternal health indicators in these districts.

**Keywords:** Scheduled Tribe, Maharashtra, High Priority Districts, Maternal health indicators, Social determinants of health, Public health infrastructure.

## Introduction

Maternal health includes the health of women during prenatal, perinatal, post-natal and postpartum period<sup>1</sup>. It is influenced by various factors such as individual characteristics and behaviours, physical environment, and socio economic and political environment<sup>2</sup>. In Maharashtra, the status of maternal health indicators as per health management information system (HMIS) scorecard shows a negative trend from 2012 to 2015 in

five tribal high priority districts (HPDs)<sup>3</sup>, namely, Dhule, Gadchiroli, Jalgaon, Nanded and Nandurbar<sup>4</sup>.

Even though National Rural Health Mission (NRHM) funding have strengthened the health system and infrastructure, the scorecard remains considerably low (Figure-1). The National Family and Health Survey (NFHS-4) findings on the rural population of the five HPDs also indicates the gaps (Table-1).

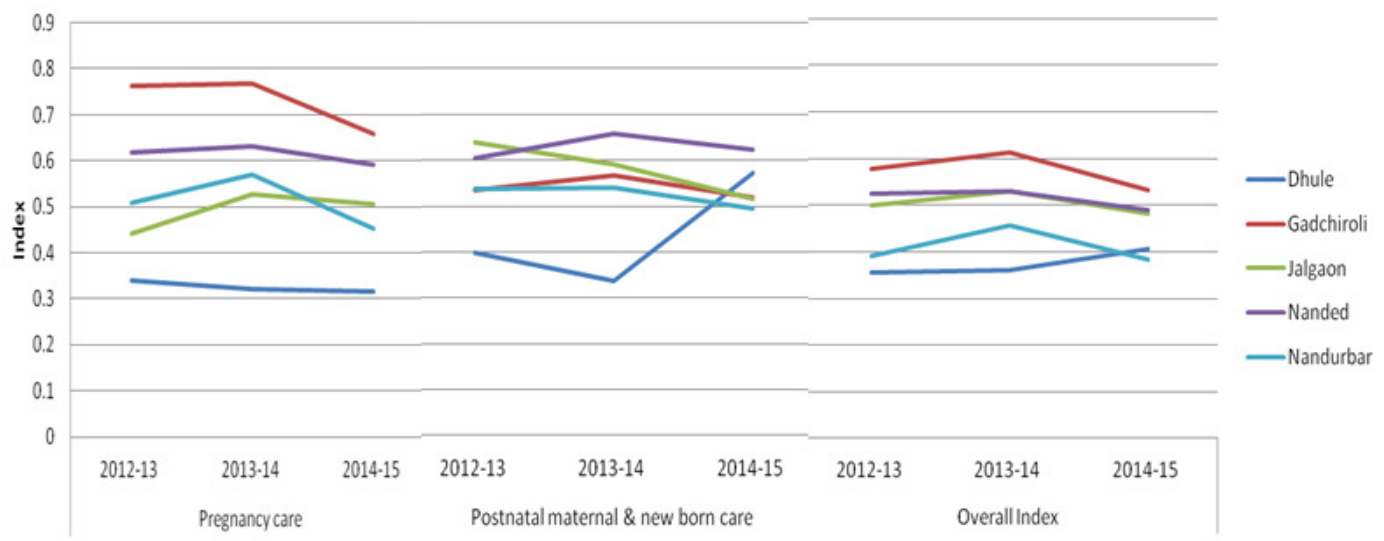


Figure-1:HMIS Index between 2012-15 (HMIS data 2012-15)<sup>3</sup>

**Table-1:** Percentage of mothers received maternal health services in HPDs<sup>5</sup>.

Maternal Health Indicators	Dhule	Gadchiroli	Jalgaon	Nanded	Nandurbar
	Rural*	Rural*	Rural*	Rural*	Rural*
Accessed antenatal check-up in the first trimester (%)	52.3	80.9	62.1	68.3	53.5
Accessed antenatal care (ANC) visits (at least four times) (%)	59.8	76.5	62.4	67.6	52.6
Accessed and utilized neonatal tetanus (TT) protection	86.0	98.8	92.4	93.7	80.5
Iron folic acid consumption (%)	12.1	49.6	41.8	41.1	38.5
Beneficiaries who accessed full antenatal care (%)	9.5	45.5	33.8	28.3	26.5
Registered pregnancies with Mother and Child Protection (MCP) card (%)	92.8	94.2	89.5	91.6	73.7
Accessed and utilized postnatal care from trained health personnel within 2 days of delivery (%)	64.6	68.9	78.8	70.6	52
Accessed financial assistance for institutional delivery under Janani Suraksha Yojana (JSY) (%)	15.8	28.4	9.7	8.6	20.2
Average private expenditure on delivery in/at public health facility	Rs. 2595	Rs. 789	Rs. 2580	Rs. 2059	Rs. 15329
Households with a health scheme or health insurance coverage (%)	23.7	19.9	10.2	19.7	13.5

\*The fact sheet shows information for rural areas and the district as a whole because Dhule, Gadchiroli, Nanded and Nandurbar have more than 70% rural population: Source: NFHS-4, 2015-16.

The access and utilization of the ANC services such as early registration (Dhule and Nandurbar), iron and folic acid consumption (Dhule), ante-natal checkups (Dhule, Nanded, and Nandurbar), post natal checkups (Nandurbar), and JSY utilization (in all five HPDs) are found to be considerably low whereas the out of pocket expenditure per delivery (Nandurbar, Nanded, Jalgaon and Dhule) is found to be unaffordable as reported by mothers. Even though registration of pregnancies for Mother and Child Protection covers more than 90%, the numbers of ANC registered mothers are less, which indicates almost one-third of pregnant women are not fully utilized the ANC services. Hence, there is a need to find out the reasons for not utilizing the maternal services which may help the planning and programme officers to fill the gaps. The objective of the present study is to find out what are the different determinants influencing maternal health indicators in five HPDs of Maharashtra.

## Methodology

We used the social determinants of maternal health framework of World Health Organization (WHO)<sup>6</sup> as the theoretical model which include micro to macro level factors such as individual,

family and community level characteristics, health services and infrastructure, socioeconomic profile of districts and Governance issues .

We searched for the available literature and database on Maharashtra as a whole and five high priority districts in particular to highlight the existing determinants.

Data from Census 2011, Socio Economic and Caste Census 2011 (SECC), NFHS 3 and 4, Rural Health Statistics 2015 (RHS), HMIS score card up to 2015, Human Development Index (HDI) report on Maharashtra-2012, reports of various Ministries, research articles, and news reports were used to correlates factors with the maternal indicators.

## Results and discussion

**Individual characteristics and behaviours of tribal population in HPDs:** Maharashtra tribal population constitutes 9.35% of the total population of the state.

As per the census 2011, the major ST groups in the five HPDs are given in the Table-2.

**Table-2:** Major tribal groups and households in five HPDs (Census 2011 and SECC 2011)<sup>7,8</sup>.

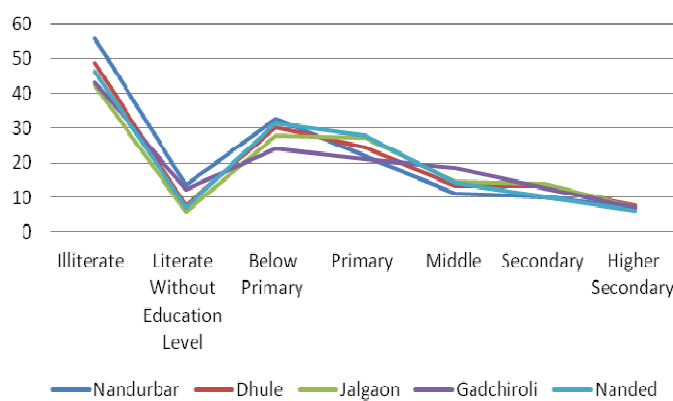
District Name	Number of ST Households	% of ST Households	Major tribal groups (>1000 population)
Nandurbar	226331	77.29	Bhil, Kokna, Gamit, Koli Mahadev, Dhanka, Koli Dhor
Dhule	113545	37.00	Bhil, Kokna, Koli Dhor, Gamit, Pardhi, Koli Mahadev, Thakur
Jalgaon	100469	15.62	Bhil, Koli Dhor, Koli Mahadev, Pardhi, Dhanka, Thakur, Naikda, Koli Malhar, Korku
Gadchiroli	85692	37.09	Gond, Pardhan, Halba, Kavar, Oraon
Nanded	45312	9.27	Andh, Koli Mahadev, Kolam, Gond, Bhil, Pardhan, Naikda, Pardhi, Thakur

Census 2011 reports that majority of the tribal men and women of scheduled tribes in Maharashtra get married at or after 18 years of age. Only 1.4% is reportedly married before 18 years. In addition, the total fertility rate among these groups is 3.1<sup>9</sup>. Whereas the sample surveys provide a different story. NFHS-4 reports 31.5% rural women of Maharashtra within the ages of 20-24 have married before attaining the legal age for marriage. In HPDs associated data sheets, these variables are at different levels. The rural women between the ages of 20-24 who are married before the age 18 years range from 9.5% to 41.8%. Women, who aged 15 -19 years and were already mothers or pregnant at the time of the NFHS 4 survey, constitute a range of 1.7% to 21.5%<sup>10</sup>. Data on the ANC utilization of early married or young mothers are not available. However, District Level Household and facility Survey (DLHS 4) of five HPDs reports that Pregnant women (of all age groups) who had three or more ANC visits ranges from 65.7% to 78.6%. It indicates that there is a one third to one quarter of the pregnant rural women who are not utilizing at least three ANC visits<sup>11</sup>. So early marriage and pregnancy seems to influence the maternal health indicators.

Education status of the population under study is found to be linked with the utilization behaviour of women accessing maternal health services. The literacy of tribal women shows a declining percentage number of educated women along with the increase in levels<sup>12</sup>. The graph (Figure-2) indicates that the percentage of illiterate to be between 40% to 50%. As the education level moves higher, the percentage of women holding corresponding qualification steadily decreases to 20% and below.

Individual spending style/capacity least favours the health spending. A study reported that most of the tribals living below poverty line (BPL) do not spend much on health care. Instead, they spent on either festival related expenses or a major portion of earning goes for paying off agriculture related debts<sup>13</sup>. In addition, they access and utilize the available public health facilities fewer times. In the case of reproductive and menstrual problems, the women feel ashamed or embarrassed to discuss it

with a male doctor in the primary health centre or community health centre (PHC/CHC) and in case of unavailability of lady doctor in hospitals; they have no choice but to take treatment at home<sup>14</sup>. Also, the dependency over traditional birth attendants during delivery at home is highly reported in the literature.



**Figure-2:** Level of education of tribal women in 5 HPDs (Census 2011)<sup>12</sup>.

The food style too influences the health of pregnant women. A report from Nandurbar affirms that the women used to suffer from malnutrition and anaemia due to the staple diet of chillies and flat unleavened bread<sup>15</sup>. Due to this, nutritional status of women is at lower levels. The BMI index of the rural women from HPDs indicates that almost one third to half of them are below the normal (BMI < 18.5 kg/m<sup>2</sup>) and the Non-pregnant women age 15-49 years who are diagnosed anaemic (<12.0 g/dl) accounts between 44% to 62% and Pregnant women age 15-49 years between 43% to 70%<sup>11</sup>.

**Family level:** The tribal population in five HPDs follow patriarchal system<sup>16-19</sup> i.e. male as the decision maker<sup>20</sup>. Women cannot independently decide on her reproductive health choices. Women are usually taking care of household activities such as agricultural operations, animal husbandry, fetching water, collection of fuel wood etc., even during pregnancy<sup>21, 22</sup>.

**Table-3:** Tribal women and ownership on operational holdings (Agriculture Census 2010-11)<sup>17</sup>.

District	% of individual holdings of Operational Holdings with tribal women	% of areas of Operational Holdings with tribal women
Dhule	17.19	15.32
Nandurbar	12.49	11.09
Jalgaon	19.75	18.80
Gadchiroli	18.98	17.87
Nanded	13.06	11.92

Another aspect is the income of family. The ST households in the HPDs are mainly engaged in casual labour (38.09% to 82.12%). Cultivators fill the other part. Women are engaged in both household activities and helping their husband in the casual labour and they are paid less or do not have power on their income. Pointing out from the perspective of women empowerment in Agriculture Index (IFPRI)<sup>23</sup>, the tribal land holdings are characterized by men ownership in the HPDs reports. The share of women who hold agricultural land is critically low (Table- 3)<sup>17</sup>. When these families live with limited resources or in abject poverty, the asymmetric distribution of resources causes entitlement failure<sup>24</sup>.

**Community level:** Hereditary factors: Sickle cell anaemia among tribal in HPDs varies from 1.97% to 35%. The Bhils, Madias, Pawaras, Pardhans and Otkars were the tribal groups who are accounted with a high prevalence of HbS (20-35 %). The prevalence of sickle cell haemoglobin (HbS), beta-thalassemia trait and G6PD deficiency are reported in Gond related endogamous tribes in Maharashtra, India<sup>25</sup>. The HbS gene frequency varies from 0.0530 to 0.1805, the beta-thal gene from 0 to 0.0283 and Gd- gene from 0.0189 to 0.1120<sup>26</sup>. Higher frequencies of pregnancy complications such as circulatory impairment, tissue damage, infarctions, severe anaemia, and life-threatening infections have been reported among these tribal women with hereditary factors<sup>27,28</sup>.

**Cultural practises:** Tribal population hold many norms, customs, and values as part of their culture system such as an early marriage system, traditional practices related to neonatal care, indigenous healthcare practice, division of labour on gender basis, and the use of intoxicants<sup>23</sup>. Problems or complications during pregnancy and childbirth were believed due to influence of evil demons living in forest and rivers or due to wrong deeds done. Therefore, they depend upon spiritual security from traditional healers. Metallic wear, hooks, chillies, etc. were

generally used to deter evil spirits from the pregnant women. Modern health care is the second choice for these people<sup>29</sup>.

Women have taken less food than required during the pregnancy so that they believed it as an effective strategy to reduce the size of the baby and for an easy delivery<sup>30</sup>. No special diet was given to pregnant women because of the fear related with increased size of the baby and difficulties in the delivery<sup>31</sup>. Similar practises of food control were reported in other studies too<sup>33,32</sup>.

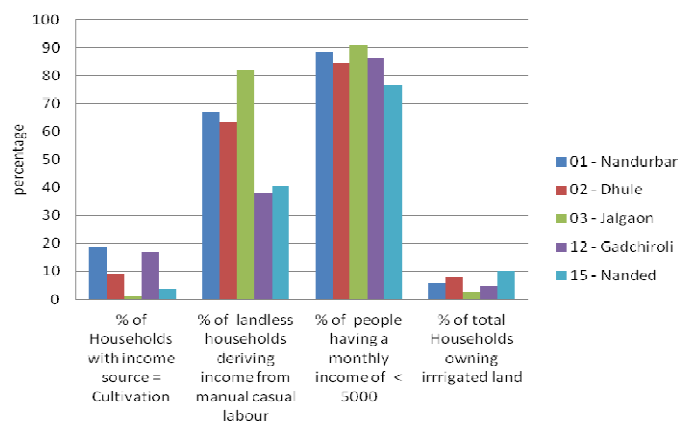
Health workers are even not allowed to conduct abdominal examination due to fear that their touch might lead to stillbirth or abortions. Also, resistance for infant check-up was observed due to beliefs that it may make the foetus weak. Similarly, TT injections given to pregnant women were believed to lead to abortions or stillbirth and therefore not taken<sup>33</sup>. These attitudes and practises create a barrier to the ANC services. Increased number of delivery (99.3%) at home by traditional birth attendants (TBAs) is also associated with the belief that the umbilical cord has to be buried next to house<sup>31</sup>.

The dependence on the medicinal plants among the tribal groups in these five districts is also found. In an ethno-botanical study, Pawara and Bhil tribes of Satpura ranges in Dhule and Jalgaon districts extensively used medicinal plants<sup>34</sup>. Knowledgeable tribal heads, witch doctors, Bhagats and Bhuwas has used a folkloric medicine to heal easy delivery<sup>35</sup>.

The socio economic profile of the tribal population in HPDs: As per the Socio Economic and Caste survey 2011, the ST population in five HPDs shows notable figures of poverty and related risks. Majority have reportedly engaged in manual casual labour (Figure-3). Out of seven criteria in the SECC census 2011, 55.38% of total ST households in five HPDs hold at least three criteria. About 75% to 90% of them lives on a monthly earning below Rs. 5000/-. Only a fraction of the ST households enjoys resources necessary for a decent living. The majority are in poverty trap and neglect the health needs especially of women.

The low socio-economic profile forces them to migrate for making a living. They work only for two to three months a year in their field and the rest of the time, they move out in search of job<sup>29</sup>. They return to their villages only during the offseason, and thus it is difficult to trace and provide necessary services to the pregnant women and children<sup>37</sup>.

**Health services and infrastructure:** The quality of care, availability and accessibility of health services are the indicators of utilization of any health services. The Human Development Index report 2012 speaks about the improvement in the availability of hospitals and beds in Maharashtra, which does not favour the rural areas<sup>38</sup>. The growing tribal population in five HPDs outnumbers the existing health infrastructure, personnel and facilities and thus is overburdened (Tables-4 and 5).



**Figure-3:** Criteria of deprivation – Key figures from five HPDs (SECC 2011)<sup>36</sup>.

**Table-4:** Tiers of Health Care Infrastructure and the Applicable Population Norms<sup>39</sup>.

Centre	Hilly/Tribal/Difficult Area (as per norms)	Situation in Tribal Areas of Maharashtra including five HPDs (in reality)
Sub-Centre	3000	4378.258
Primary Health Centre	20000	28590.72
Community Health Centre	80000	134419.1

The existing infrastructure is inadequate to serve the growing tribal population. The shortfall of infrastructure can be further elaborated as follows:

Even though the number of field level workers are present in the system to register the pregnant ladies in first trimester, such effort is not supported at later stage due to the absence of adequate medical and paramedical staff like Obstetricians & Gynaecologists, Physicians, Surgeon, Nursing Staff at CHCs and PHCs.

The non-availability of nearby services of Sub centre, PHCs and CHCs are significantly indicating the quality of care. The distance to the medical facilities varies from district to district. The data from Census 2011 reveals that distance to different medical facilities in five HPDs ranges from 1–30 kms for hospitals, 1-40 kms for Dispensaries and health centres, 1-30 kms for Family welfare centres, 1–210 kms for Maternity and child welfare centres and 1–210 kms for Maternity homes<sup>41</sup>.

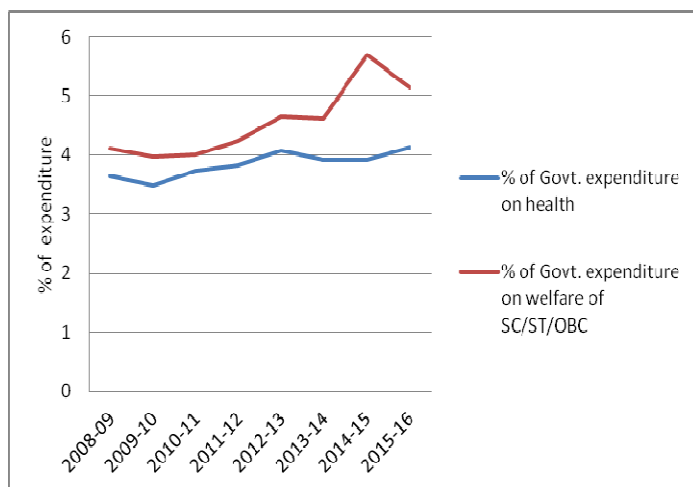
**Socio economic profile of HPDs:** High Priority Districts are those districts, which shows poor performance in health outcomes and equitable health care<sup>4</sup>. Dhule, Gadchiroli, Jalgaon, Nanded and Nadurbar are the five tribal districts listed in High Priority Districts. Except Jalgaon, other four districts are also listed in the Backward Regions Grant Fund Programme under Ministry of Panchayati Raj because of their persistent imbalances in the development scenario of Maharashtra<sup>42</sup>.

**Table-5:** Number of Sub Centres, PHCs and CHCs in Tribal Areas (Rural Health Statistics 2015)<sup>40</sup>.

State	Tribal Population	SC Required	SC Shortfall	PHC Required	PHC Shortfall	CHC Required	CHC Shortfall
Maharashtra	9006077	3002	945	450	135	112	45
Human Resource (Rural Health Statistics 2015) <sup>40</sup>				Required	In position	Shortfall	
Health Worker [F] / ANM at Sub Centre and PHC				2372	6833	0	
Health Worker [M] at Sub Centre				2057	1375	682	
Health Assistants [Male] at PHCs				315	700	0	
Health Assistants [Female] / LHV at PHCs				315	739	0	
Total Specialist at Community Health Centres				268	83	185	
Obstetricians and Gynaecologists at CHCs				67	29	38	
Surgeon at CHCs				67	16	51	
Physicians at CHCs				67	15	52	
Nursing Staff at PHCs and CHCs				784	646	138	
Lab Technicians at PHCs and CHCs				382	400	0	

Dhule is the sixth poorest of Maharashtra's 35 districts. It takes the sixth position from the bottom on the HDI as well. Out of its 237,688 families, 55.64 per cent are classified as BPL<sup>43</sup>. 38.71% of Gadchiroli population belongs to scheduled tribes<sup>44</sup>. The anti-Naxal operation (ANO) wing of the Maharashtra police had reported the presence of insurgency problem in Gadchiroli is due to the larger problem of economic backwardness of the tribals<sup>45</sup>. Jalgaon district is part of the Nashik division and the percentage of Scheduled tribes in the total population is 11.84%<sup>46</sup>. Nanded is predominantly an agrarian economy and majority of its population lives in rural areas<sup>46</sup>. Nandurbar is one of most backward districts with high Infant and maternal mortality rates, high level of malnutrition among children and high concentration of tribal population<sup>46</sup>.

**Governance issues:** As per the social determinants framework, governance plays an important role. In the case of Maharashtra, an analysis of the key social sector expenditure discloses the neglect towards the health and welfare of the SC/ST and other backward class (OBC) over the years. Figure-4 shows the percentage of government expenditure on two major sectors<sup>47</sup>. Both the lines remained stagnant except a minor fluctuation for health expenditure in 2014-15. Comparing to the health and welfare needs of the state especially the growing tribal population, these budgetary provisions are insufficient. Recent years, National Health Mission policy has changed centre-state contribution share. State funding was asked to increase from 25% to 40% to the existing programmes whereas centre contribution has reduced from 75% to 60% in the health projects. This changing pattern has led to cuts in the key health programmes<sup>48</sup>.



**Figure-4:** Key social sector expenditure in Maharashtra (Duggal R, 2015)<sup>47</sup>

Another side of the coin is the poor planning, management and implementation of the schemes. A report on the Maharashtra nutrition mission reveals that major portion of tribal budget spent on infrastructure development whereas there is hardly enough budget provided neither for the maintenance nor for the human development<sup>49</sup>.

Converging effort is missing at planning and implementing level. A flagship scheme in Maharashtra for the pregnant and lactating women in Maharashtra, namely Dr. APJ Abdul Kalam Amrut Ahar Yojna, has witnessed the fate of lack of convergence. The state has entrusted the responsibility of serving the cooked food with anganwadis whereas majority of anaganwadis (70%) do not have own cooking facilities. The scheme compelled the anganwadi sevika to find fuel by herself and do the service for a meagre amount of Rs 250 per month as remuneration for cooking<sup>50</sup>. Again, this programme was crippling to start due to complex fund-transfer-mechanism and the tribal development department has not allotted any complementary budget provision for basic amenities like cooking-gas and utensils.

As per the results of evaluation study of JSY in the tribal area in Maharashtra, only 69% of the sample population were eligible for the JSY provisions whereas only half of them has availed the benefits. Problems faced by the women while availing the JSY benefits were difficulty in obtaining required certificates from health providers, late submission, and non-cooperation by facility staff, etc.<sup>51</sup>.

**Discussion:** The present paper tried to find out the various factors directly or indirectly influencing maternal health indicators in five HPDs of Maharashtra based on the WHO theoretical framework on social determinants of maternal health. The individual, family, community, health system, socioeconomic and governance levels of data has been collected from various sources. The maternal health is influenced at individual, family and community level. The influence varies along with the resources, behaviours, and beliefs of the women. Family conforms its members including women to the community pattern and practice traditional decision-making. The community ensures the maintenance of system through norms and sanctions, which binds individuals, groups and families within the community. At intermediate level, the health system stands as a provider with standardised procedure, which may or may not be acceptable to the tribal community. At macro level, socio-economic characteristics of a districts influences resources, which may be necessary for healthy living. The governance influences the nature of health system functioning (from policy to implementation level) and program implementation. Together, they influence the maternal health at varying degrees.

Across the world, similar studies have reported about micro and macro level determinants that influence maternal health. It includes geographical locations<sup>52</sup>, power<sup>54</sup>, governance<sup>55</sup>, education<sup>56,57</sup>, social class<sup>58</sup>, social factors<sup>59</sup>, socio-economic differences<sup>60-63</sup>, gender<sup>64</sup>, employment<sup>65-67</sup>, social environment<sup>68,69</sup>, social capital<sup>70</sup>, social position<sup>71</sup>, lifestyle<sup>72,73</sup>, caste<sup>74</sup>, socio-cultural and behavioural determinants<sup>75</sup>, healthcare service and infrastructure<sup>76,77</sup> etc. These all influence the maternal health outcomes.

This study has got limitations such as availability of data, due to very less studies conducted among tribal of five HPDs. Also, many of the primary data based studies were not specifying the nature of study population clearly.

## Conclusion

Poor maternal health indicators influenced by micro and macro level factors in the selected HPDs. In spite of the service delivery by the health system through the central and state schemes, there is need of tailored programmes with a focus on the social values taken into account. The area under research requires context-specific and culturally and socially acceptable provisioning of care along with health system strengthening and inter-sectoral convergence. All these efforts succeeds only if they are accepted at grass root level and thus improved community participation in utilization of maternal health care.

## References

1. World Health Organization (2017). Maternal health. [http://www.who.int/topics/maternal\\_health/en/](http://www.who.int/topics/maternal_health/en/). Accessed 19/01/2017.
2. Commission for Social Determinants of Health (2017). Closing the gap in a generation: Health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. [http://apps.who.int/iris/bitstream/10665/43943/1/9789241563703\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/43943/1/9789241563703_eng.pdf). Accessed 22/01/2017.
3. MHFW (2017). Ministry of Health and Family Welfare. Standard Reports. [https://nrhm-mis.nic.in/hmisreports/frmstandard\\_reports.aspx](https://nrhm-mis.nic.in/hmisreports/frmstandard_reports.aspx). Accessed 19/02/2017
4. MHFW (2016). Ministry of Health and Family Welfare. List of High Priority Districts (HPDs) in the country. <http://pib.nic.in/newsite/PrintRelease.aspx?relid=118620>. Accessed 30/10/2016.
5. IIPS (2016). International Institute of Population Science. State Fact Sheet – Maharashtra. <http://rchiips.org/nfhs/pdf/NFHS4/Maharashtra.pdf>. Accessed 02/11/2016.
6. World Health Organization (2017). Social determinants approach to maternal deaths. [http://www.who.int/maternal\\_child\\_adolescent/epidemiology/maternal-death-surveillance/case-studies/india-social-determinants/en/](http://www.who.int/maternal_child_adolescent/epidemiology/maternal-death-surveillance/case-studies/india-social-determinants/en/). Accessed 02/01/2017.
7. Ministry of Rural Development (2016). State wise District Caste Profile Report-Maharashtra. <http://www.secc.gov.in/statewiseDistrictCasteProfileReport>. Accessed 03/11/2016.
8. Registrar General of India (2016). District Wise Scheduled Tribe Population – Maharashtra. [http://www.censusindia.gov.in/2011census/PCA/SC\\_ST/PCA-A11\\_Appendix/ST-27-PCA-A11-APPENDIX.xlsx](http://www.censusindia.gov.in/2011census/PCA/SC_ST/PCA-A11_Appendix/ST-27-PCA-A11-APPENDIX.xlsx). Accessed 01/11/2016.
9. Registrar General of India (2017). Maharashtra Data Highlights: The Scheduled Tribes-Census of India 2001. [http://censusindia.gov.in/Tables\\_Published/SCST/dh\\_st\\_maha.pdf](http://censusindia.gov.in/Tables_Published/SCST/dh_st_maha.pdf). Accessed 08/01/2017.
10. Ministry of Health and Family Welfare (2017). District Level Household and facility Survey 4. <https://nrhm-mis.nic.in/SitePages/DLHS-4.aspx?RootFolder=%2FDLHS4%2FState%20and%20District%20Factsheets%2FMaharashtra&FolderCTID=0x012000742F17DFC64D5E42B681AB0972048759&View={F8D23EC0-C74A-41C3-B676-5B68BDE5007D}>. Accessed 02/02/2017.
11. International Institute of Population Science (2016). Key Findings from NFHS-4 – Maharashtra. <http://rchiips.org/NFHS/MH.shtml>. Accessed 02/12/2016.
12. Registrar General of India (2016). ST-9 Population Attending Educational Institutions By Age, Sex And Type Of Educational Institution (For Each Tribe Separately) – 2011. <http://www.censusindia.gov.in/2011census/SCST-Series/ST09A/ST-31-00-09A-DDW-2011.XLS>. Accessed 02/11/2016.
13. Birdi T.J., Joshi S., Kotian S. and Shah S. (2014). Possible Causes of Malnutrition in Melghat, a Tribal Region of Maharashtra, India. *Glob J Health Sci.*, 6(5), 164-173. DOI: 10.5539/gjhs.v6n5p164.
14. Shukla A. (2016). Dimensions of Tribal Health in Sahayadri Region: Assessment and Administration of Health in Tribal Communities living near Chas Kaman Dam. <https://www.academia.edu/4668592>. Accessed 01/11/2016.
15. Boga D. (2015). Barefoot auditors ensure health for tribal mothers. *India Together (E-news magazine)*. <http://indiatgether.org/auditors-of-maternal-health-for-tribal-mothers-and-children-in-nandurbar-health>. Accessed on 01/09/2016.
16. Valvi D.N. (2016). A Study of the Impact of Welfare Measures on Tribal Development in Nandurbar and Dhule districts of Maharashtra. Lakshmi Publications, Solapur, 120, ISBN: 1329381904.
17. Agriculture Census Division, DAC (2016). Number and area of holding by size class - agricultural census, 2010-11. <http://agcensus.dacnet.nic.in/stateholdingsizeclass.aspx>. Accessed on 29/08/2016.
18. Murkute S.R. (1990). Socio-cultural Study of Scheduled Tribes: The Pardhans of Maharashtra. Concept publications, New Delhi, 2, 106, ISBN: 8170222621.
19. Tribhuwan R.D. (2004). Health of Primitive Tribes. Discovery publishing house, New Delhi, 82, ISBN 10: 8171419038.
20. Mann K. (1996). Tribal women on the threshold of twenty-first century. MD publications, New Delhi, 72-73, ISBN: 8185880883.

21. Bhanu B.V. (2004). People of India: Maharashtra part two, volume xxx. Anthropological Survey of India Kolkota, x-2130, SBN 10: 8179911004.
22. Nerkar S.S., Tamhankar A.J., Johansson E. and Lundborg C.S. (2016). Impact of Integrated Watershed Management on Complex Interlinked Factors Influencing Health: Perceptions of Professional Stakeholders in a Hilly Tribal Area of India. *Int J Environ Res Public Health*, 13(3), 285. DOI: 10.3390/ijerph13030285.
23. Alkire Sabina, Meinzen-Dick Ruth, Peterman Amber, Quisumbing Agnes, Seymour Greg and Vaz Ana (2013). The Women's Empowerment in Agriculture Index. IFPRI Discussion Paper 1240. Washington, D.C.: International Food Policy Research Institute. <http://ebrary.ifpri.org/cdm/singleitem/collection/p15738col12/id/127346>. Accessed 05/02/2017.
24. Juhos A. (2013). Missing women in Maharashtra – Reasons for excess female mortality in adulthood. Conference proceeding book from International Research Universities Network and Catholic Universities Partnership- Graduate Students' Conference. Piliscsaba, Hungary. 29<sup>th</sup> -31<sup>st</sup> August. 107-112.
25. Mukherjee M.B., Colah R.B., Martinet S. and Ghosh K. (2015). Glucose-6-phosphate dehydrogenase (G6PD) deficiency among tribal populations of India - Country scenario. *Indian J Med Res.*, 141(5), 516-520. DOI: 10.4103/0971-5916.159499.
26. Rao V.R. and Gorakshakar A.C. (1990). Sick cell hemoglobin, beta-thalassemia and G6PD deficiency in tribes of Maharashtra, India. *Gene Geogr.*, 4(3), 131-134.
27. Boulet SL, Okoroh EM, Azonobi I, Grant A. and Hooper W.C. (2013). Sick Cell Disease in Pregnancy: Maternal Complications in a Medicaid-Enrolled Population. *Matern Child Health J.*, 17(2), 200-207. DOI: 10.1007/s10995-012-1216-3.
28. James A.H. (2014). Sick cell disease in pregnancy. *Contemporary OB/GYN (E-Newsletter)* <http://contemporaryobgyn.modernmedicine.com/contemporary-obgyn/news/sickle-cell-disease-pregnancy?page=full>. Accessed 02/03/2017.
29. Sonowal C.J. (2010). Factors affecting the nutritional health of tribal children. *Ethno Med.*, 4(1), 21-36.
30. Bang A.T., Bang R.A., Baitule S., Deshmukh M. and Reddy M.H. (2001). Burden of Morbidities and the Unmet Need for Health Care in Rural Neonates - A Prospective Observational Study in Gadchiroli, India. *Indian Paediatrics*, 38(9), 952-966.
31. Training and Research Institute (2007). Health Care of Tribal Women: A cross-cultural Tribal Study. Training and Research Institute, Pune, 24-25, 53-54, 84-85, 91.
32. Jungari S. and Paswan B. (2016). Newborn care practices among the indigenous population of Maharashtra, India: A mix method approach. Conference proceedings book of ICRH Conference, Mumbai, India, Feb. 28-April, 2, 51-65.
33. Tribal Training and Research Institute (1995). An Evaluation Study of Health and Nutritional Beliefs, Practices, & Facilities among the Tribals of Dharni and Chikhaldara Tehsils, Pune. Maharashtra. Tribal Training and Research Institute, Pune, 91-92.
34. Jain D.L., Baheti A.M., Jain S.R. and Khandelwal K.R. (2010). Use of medicinal plants among tribes in Satpuda region of Dhule and Jalgaon Districts of Maharashtra-An ethno-botanical study. *Indian Journal of traditional Knowledge*, 9(1), 152-157.
35. Pawar S. and Patil D.A. (2004). Observations on folkloric medicinal plants of Jalgaon district, Maharashtra. *Indian Journal of Traditional Knowledge*, 3(4), 437-441.
36. Ministry of Rural Development (2016). Deprived ST Households – Maharashtra - SECC 2011. <http://secc.gov.in/districtCategorywiseDeprivationReport>. Accessed 29/08/2016.
37. Kulkarni D. (2015). Maharashtra government aims to lower maternal mortality ratio in tribal Maharashtra. *Daily News Analysis (online)*. <http://www.dnaindia.com/india/report-maharashtra-government-aims-to-lower-maternal-mortality-ratio-in-tribal-maharashtra-2057990>. accessed 18 Aug 2016.
38. YASHADA (2016). Maharashtra Human Development Report 2012: Towards Inclusive Human Development. <http://niti.gov.in/writereaddata/files/humandevlopment/Maharashtra%20State%20Human%20Development%20Report%202012.pdf>. Accessed 02 Nov 2016.
39. Ministry of Tribal Affairs (2016). Statistical Profile of Scheduled Tribes in India 2013. <http://tribal.nic.in/WriteReadData/userfiles/file/Statistics/StatisticalProfileofSTs2013.pdf>. Accessed 05/10/2016.
40. Ministry of Health and Family Welfare (2017). Rural Health Statistics 2015. <https://nrhm-mis.nic.in/Pages/RHS2015.aspx?RootFolder=%2FRURAL%20HEALTH%20STATISTICS%2F%28A%29RHS%20-%202015&FolderCTID=&View={C50BC181-07BB-4F78-BE6F-FCE916B64253}>. Accessed 05/01/2017.
41. Registrar General of India (2017). District Census Handbook – Maharashtra – Census 2011. [http://www.censusindia.gov.in/2011census/dchb/Maharashtra\\_A.html](http://www.censusindia.gov.in/2011census/dchb/Maharashtra_A.html). Accessed 05/01/2017.
42. Ministry of Panchayati Raj (2016). Backward Regions Grant Fund Programme Guidelines. <http://www.panchayat.gov.in/documents/10198/0/BRGFFINALGUIDELINES.pdf>. Accessed 18/08/2016.



43. Mishra L. (2016). Pharma baron helps cure Dhule's drought woes. *The Hindu (online)*. <http://www.thehindu.com/news/national/pharma-baron-helps-cure-dhules-drought-woes/article8721391.ece>. Accessed on 29/08/2016.
44. Registrar General of India (2016). District Census Handbook – Gadchiroli. [http://www.censusindia.gov.in/2011census/dchb/2712\\_PART\\_B\\_DCHB\\_GADCHIROLI.pdf](http://www.censusindia.gov.in/2011census/dchb/2712_PART_B_DCHB_GADCHIROLI.pdf). Accessed 29/08/2016.
45. Panigrahi D. (2016). Development hubs to give Gadchiroli much-needed boost. *Hindustantimes (online)*. <http://www.hindustantimes.com/mumbai/development-hubs-to-give-gadchiroli-much-needed-boost/story-cf2yL32QnMHtny61MjOpkM.html>. Accessed 29/08/2016.
46. Ministry of Health and Family Welfare (2016). Monitoring and Evaluation of Programme Implementation Plan report, 2013-14. <https://nrhm-mis.nic.in/SitePages/HMISPeriodicReport.aspx?RootFolder=%20FPart%20B%20Demographic%20and%20Vital%20Indicators%20Monitoring%20of%20various%20districts%20during%20201314%20Districts%20PIP%20Report%20201314%20Maharashtra&FolderCTID=0x012000F14E657A4E28DE48BA36CCAF7331E92D&View={15AC35C6-AEC6-4336-AC516F9CE3A31418}>. Accessed 30/10/2016.
47. Duggal R. (2016). Maharashtra Budget 2015-16: Continued Abject Neglect of the Social Sectors. <http://righttohealthcare.blogspot.in/2015/03/maharashtra-budget-2015-16-continued.html> Accessed 30/10/2016.
48. Barnagarwala T. (2016). Fadnavis' report card: More state funds needed for health programmes. *Indian Express (online)*. <http://indianexpress.com/article/india/india-news-india/maharashtra-fadnavis-report-card-more-state-funds-needed-for-health-programmes-3727670/>. Accessed 02/11/2016.
49. Krishna V. (2016). The Maharashtra nutrition mission. [http://www.india-seminar.com/2016/681/681\\_vandana\\_krishna.htm](http://www.india-seminar.com/2016/681/681_vandana_krishna.htm). Accessed 31/10/2016.
50. Srivastava K. (2016). Launched at one year of Fadnavis govt, Abdul Kalam Amrut Ahar Yojna remains largely on paper. *Daily News Analysis (online)*. <http://www.dnaindia.com/india/report-launched-at-one-year-of-fadnavis-govtabdul-kalam-amrut-ahar-yojna-remains-largely-on-paper-2177819>. Accessed 22 Aug 2016.
51. Doke P.P., Gawande U.H., Gadgi M. and Deshpande S.R. (2015). Evaluation of Janani Suraksha Yojana (JSY) in Maharashtra, India: Important Lessons for Implementation. *International Journal of Tropical Disease & Health*, 5(2), 141-155. DOI: 10.9734/IJTDDH/2015/13800
52. Murray C.J., Kulkarni S.C., Michaud C., Tomijima N., Bulzacchelli M.T., Iandiorio T.J. and Ezzati M. (2006). Eight Americas: investigating mortality disparities across races, counties, and race-counties in the United States. *PLoS Med.*, 3(9), e260. <https://doi.org/10.1371/journal.pmed.0030545>
53. Farmer P. (2004). Pathologies of power: Health, human rights, and the new war on the poor. University of California Press, Berkeley, 1-420. ISBN-10: 0520243269.
54. Wallerstein N. (2006). What is the evidence on effectiveness of empowerment to improve health?. WHO, Copenhagen, 1-37. [http://www.euro.who.int/\\_data/assets/pdf\\_file/0010/74656/E88086.pdf](http://www.euro.who.int/_data/assets/pdf_file/0010/74656/E88086.pdf). Accessed 08/02/2017.
55. Hanumappa S. and Prashanth N.S. (2011). Good governance in health care: The Karnataka experience. *The Lancet*, 377(9768), 790-792. [http://doi.org/10.1016/S0140-6736\(10\)62041-7](http://doi.org/10.1016/S0140-6736(10)62041-7)
56. Hurt L.S., Ronsmans C. and Saha S. (2004). Effects of education and other socioeconomic factors on middle age mortality in rural Bangladesh. *J. Epidemiol. Community Health*, 58(4), 315-320. DOI: 10.1136/jech.2003.007351
57. Erikson R. (2001). Why do graduates live longer?. In: Cradle to grave: Life-course change in modern Sweden. Jonsson JO, and Mills C (eds). Sociology Press Durham, 211-227. ISBN: 1903457033.
58. Donkin A., Goldblatt P. and Lynch K. (2002). Inequalities in life expectancy by social class 1972-1999. *Health Stat. Q.*, 15, 5-15.
59. Plavinski S.L., Plavinskaya S.I. and Klimov A.N. (2003). Social factors and increase in mortality in Russia in the 1990s: Prospective cohort study. *BMJ*, 326(7401), 1240-1242. DOI: 10.1136/bmj.326.7401.1240
60. Marmot M.G. and Shipley M.J. (1996). Do socioeconomic differences in mortality persist after retirement? 25 year follow up of civil servants from the first Whitehall study. *BMJ*, 313(7066), 1177-1180. <https://doi.org/10.1136/bmj.313.7066.1177>
61. Lynch J.W., Davey-Smith G., Kaplan G.A. and House J.S. (2000). Income inequality and mortality: Importance to health of individual income, psychosocial environment, or material conditions. *BMJ*, 320(7243), 1200-1204. DOI: <https://doi.org/10.1136/bmj.320.7243.1200>
62. Marmot M. and Wilkinson R.G. (2001). Psychosocial and material pathways in the relation between income and health: A response to Lynch et al. *BMJ*, 322(7296), 1233-1236. <https://doi.org/10.1136/bmj.322.7296.1233>
63. Gwatkin D., Johnson K., Wagstaff A., Rutstein S., Suliman E. and Amouzou A. (2007). Socioeconomic differences in health, nutrition, and population-45 countries. Washington. <http://www.worldbank.org/prem/poverty/health/data/statusind.htm>. Accessed 02/11/2016.

64. Sen A. (2003). Missing women--revisited: reduction in female mortality has been counterbalanced by sex selective abortions. *BMJ*, 327(7427), 1297-1299. <https://doi.org/10.1136/bmj.327.7427.1297>
65. Karasek R. and Theorell T. (1992). *Healthy work: Stress, productivity, and the reconstruction of working life*. Basic Books, New York, 1-381. ISBN: 0465028977.
66. Marmot M.G., Bosma H., Hemingway H., Brunner E. and Stansfeld S. (1997). Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet*, 350(9073), 235-239. [http://doi.org/10.1016/S0140-6736\(97\)04244-X](http://doi.org/10.1016/S0140-6736(97)04244-X).
67. Pikhart H., Bobak M., Pajak A., Malyutina S., Kubinova R., Topor R., Sebakova H., Nikitin Y. and Marmot M. (2004). Psychosocial factors at work and depression in three countries of Central and Eastern Europe. *Soc. Sci. Med.*, 58(8), 1475-1482. [http://doi.org/10.1016/S0277-9536\(03\)00350-2](http://doi.org/10.1016/S0277-9536(03)00350-2).
68. Stafford M., Bartley M., Wilkinson R., Sacker A., Marmot M., Boreham R. and Thomas R. (2003). Measuring the social environment: Social cohesion and material deprivation in English and Scottish neighbourhoods. *Environ. Planning A.*, 35(8), 1459-1475. <https://doi.org/10.1068/a35257>.
69. Brunner E.J., Davey S.G., Marmot M., Canner R., Beksinska M. and O'brien J. (1996). Childhood social circumstances and psychosocial and behavioural factors as determinants of plasma fibrinogen. *Lancet*, 347(9007), 1008-1013. DOI: 10.1016/S0140-6736(96)90147-6
70. Szreter S. and Woolcock M. (2004). Health by association? Social capital, social theory, and the political economy of public health. *Int. J. Epidemiol.*, 33(4), 650-667. DOI: <https://doi.org/10.1093/ije/dyh013>.
71. Brunner E., Juneja M. and Marmot M. (1998). Abdominal obesity and disease are linked to social position. *BMJ*, 316(7127), 308-309. <https://doi.org/10.1136/bmj.316.7127.308a>.
72. Academy of Medical Sciences (2004). *Calling time: The nation's drinking as a major health issue*. AMS, London, 1-42. ISBN: 1-903401-06-2.
73. Subramanian S.V., Smith G.D. and Subramanyam M. (2006). Indigenous health and socioeconomic status in India. *PLoS Med.*, 3(10), e421. <https://doi.org/10.1371/journal.pmed.0030421>.
74. Hoff K. and Pandey P. (2004). *Belief systems and durable inequities: An experimental investigation of Indian caste*. World Bank Policy Research Working Paper. Report No. 3351. World Bank, Washington DC, 1-44. <http://www-siepr.stanford.edu/conferences/Institutions2005/hoff-pandey-belief%20systems.pdf>. Accessed 06/01/2017.
75. Caldwell J.C. (1993). Health transition: The cultural, social and behavioural determinants of health in the Third World. *Social Science & Medicine*, 36(2), 125-135. [https://doi.org/10.1016/0277-9536\(93\)90204-H](https://doi.org/10.1016/0277-9536(93)90204-H).
76. Narayan R. (2011). Universal health care in India: Missing core determinants. *The Lancet*, 377(9769), 883-885. [http://dx.doi.org/10.1016/S0140-6736\(10\)62045-4](http://dx.doi.org/10.1016/S0140-6736(10)62045-4).
77. Grover A. and Citro B. (2011). India: Access to affordable drugs and the right to health. *The Lancet*, 377(9770), 976-977. [http://dx.doi.org/10.1016/S0140-6736\(10\)62042-9](http://dx.doi.org/10.1016/S0140-6736(10)62042-9).