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IMPACT OF BIOMASS FUEL ON EXPECTING MOTHER (A REVIEW PAPER)

Anita pandey
Phd. Research scholar
P.G.Dept. of Home science, Sambalpur University,

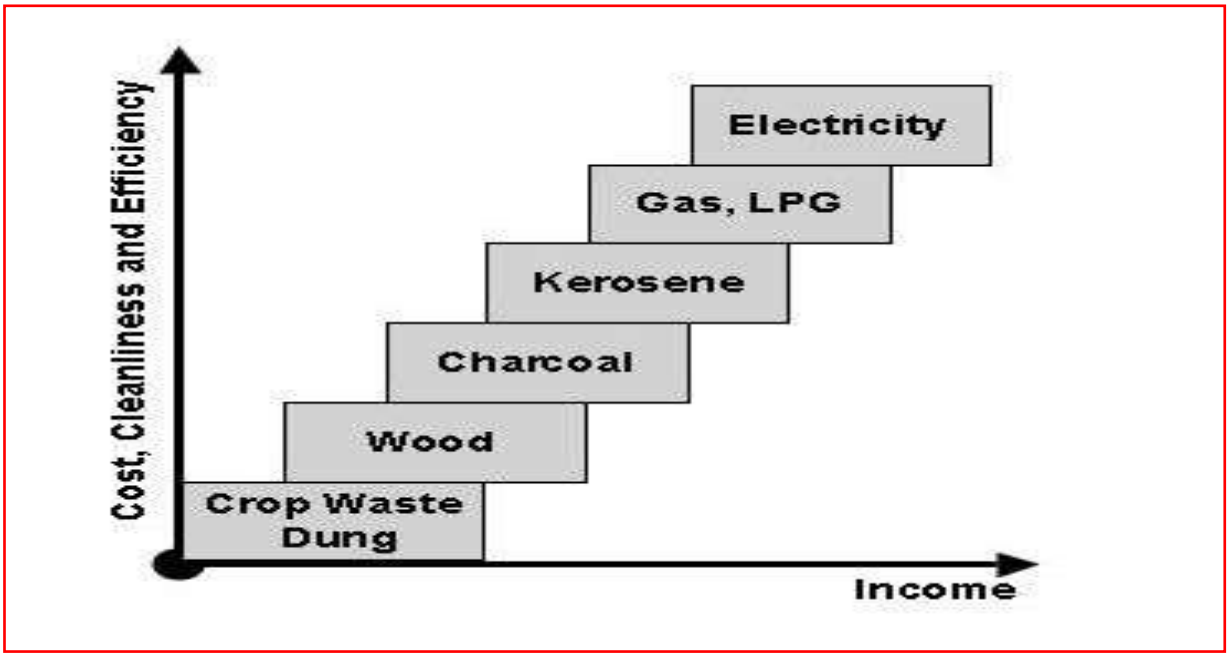
ABSTRACT

Almost half of the world's populations, who live-in low-income regions, use biomass fuel as a primary source of cooking fuel. Specifically more women and children are highly exposed to indoor air pollution (IAP).According to World Health Organization (WHO), around 3 billion people use solid fuel for cooking which is expected to grow until at least 2030.According to UNICEF, exposure to household air pollution from cooking has adversely impact on pregnancy outcome which is significantly increases the risk of Low Birth Weight (LBW) among babies. Also, according to WHO, 90% of all Low Birth Weight (LBW) babies are born in developing countries and half of the population in developing nation used solid fuels as primary source of energy cooking. Such types of cooking practices lead to serious health hazards during prenatal period caused by smoke from solid cooking fuels include charcoal, wood, straw, grass and dung cake. The present study is based on the secondary data with the following objectives. To study the impact of particulate matter ($PM_{2.5}$) and (PM_{10}) on birth weight of the child. Attempt to evaluate the primary and secondary outcome of pregnant women. To analysis the main issues and challenges of Pradhan Mantri Ujjwala Yojana (PMUY) launched by central Government.

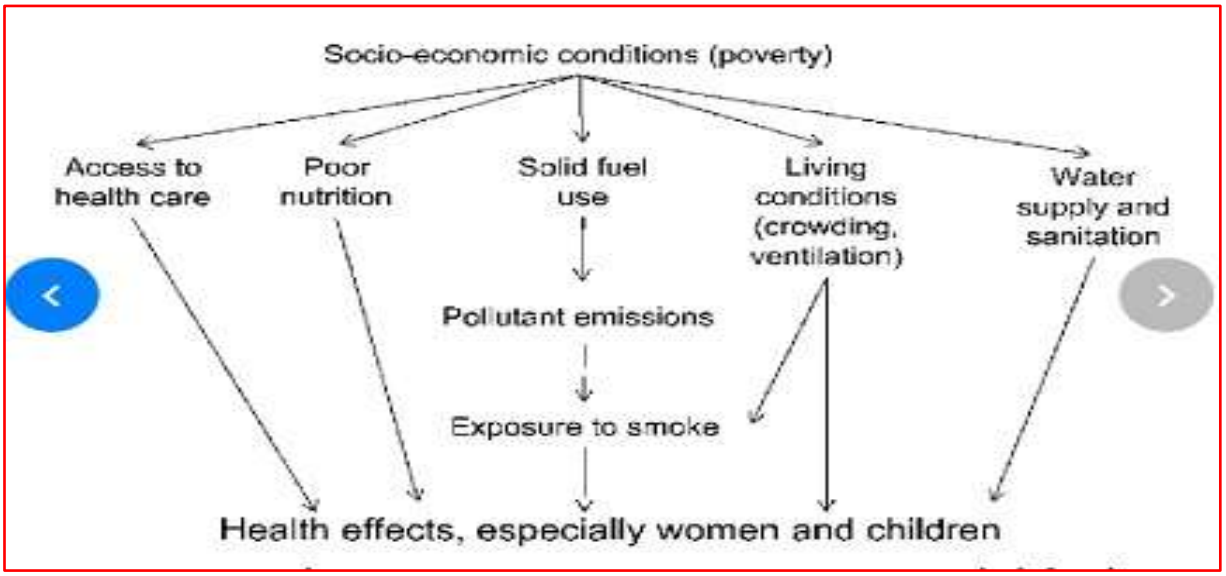
Key words: -poverty, cooking fuel**,** ($PM_{2.5}$)&(PM_{10}) and Pradhan Mantri Ujjwala Yojana (PMUY)

INTRODUCTION:

The United Nations Millennium Declaration, signed in September 2000 commits world leaders to combat poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women.Out of the eight goalsenvironmental sustainability is the most important goal for developing countries.World Health Organization (WHO), around 3 billion people use solid fuel for cooking which is expected to grow until at least 2030.UNICEF, exposure to household air pollution from cooking has adversely impact on pregnancy outcome which is significantly increases the risk of Low Birth Weight (LBW) among babies. according to WHO, 90% of all Low Birth Weight (LBW) babies are born in developing countries and half of the population in developing nation used solid fuels as primary source of energy cooking. low income regions, use biomass fuel as a primary source of fuel cooking. Specifically, more women and children are highly exposed to indoor air pollution (IAP).



Socio economic condition impact on health status especially women and children



The role of socio-economic disparities in exposure to air pollution

Socio economic condition or poverty impact on health status epically women and children. Due to low socio-economic status they do not access health careservice, suffering from poor nutrition, basic amenities also not full fill such as clean cooking fuel, living condition and clean water supply. When they directly contact to solid fuel leads to pollutant emission and highly exposure to smoke which is directly impact on their health.

There havebeen different studies conducted primarily in Europe and North America which suggest a higher risk of morbidity and mortality related to air pollution as a result of economic deprivation. Exposure to air pollution has been found to be dependent upon the socioeconomic status of an individual. People at a lower socioeconomic status experience higher levels of exposure to air pollution and also different factors impact on health such as health and nutritional status, and access to medical services which are themselves related to the socioeconomic status of individuals[4].

According to a study conducted jointly by the World Bank and the Institute of Health Metrics and Evaluation on the economic cost of air pollution, 8.5% of India's GDP was lost due to air pollution in terms of the welfare costs and the lost labour incomes in the year 2013. This study, while a good start in quantifying the economic burden of air pollution in India, only captured lost productivity and welfare costs associated with premature mortality[13].As per the ministry of Health & Family Welfare Government of India,2017 around 60 million of people living in the poverty line and each year they spend more on primarily treatment on of chronic diseases and purchase of medicines[17]. Unhealthy air also makes people less productive due to higher rates of sickness and hospitalization further justifying the need to study the economic impacts of air pollution in quantifiable terms through systematic epidemiological methods.[5]

Objectives of the study: -

1. To study the impact of particulate matter ($PM_{2.5}$) and (PM_{10}) impact on birth weight of the child.
2. Attempt to evaluate the primary and secondary outcome of pregnant women.
3. To analysis the main issues and challenges of Pradhan Mantri Ujjwala Yojana (PMUY) launched by central Government.

Material and methodology: -

The materials and data are related to this article is collected from secondary sources such as different case studies, books, journals and net etc**.**

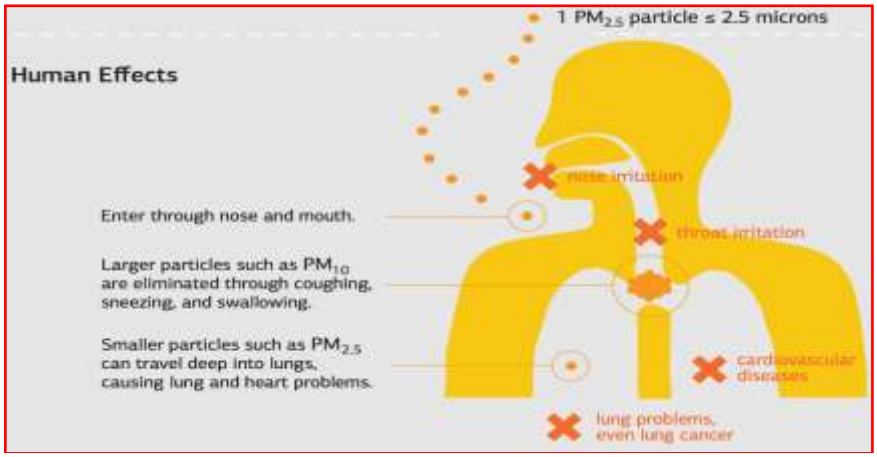
DISCUSSION

To study the impact of particulate matter ($PM_{2.5}$) and (PM_{10}) impact on birth weight of the child: -

Components of air pollution: -

The two basic physical forms of air pollutants are particulate matter and gases. Particulate matter includes small solid and liquid particles such as dust, smoke, sand, pollen, mist, and fly ash. Gases include substances such as carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxides (NO2), and volatile organic compounds (VOCs).

It is important to understand the chemical speciation of particulate matter to recognise the varied health effects of the individual components of PM. For instance, even though PM2.5 may comprise of silica, ammonia, sulphates, and black carbon among other constituents, the association of black carbon with health outcomes is far stronger. It is, therefore, important to study the composition of particles as well as the sources of those pollutants, evidence for which is currently lacking in the research being conducted on air pollution in India. Currently, in global and national estimates, PM2.5 is considered as a uniform substance, whereas the composition varies at local, national and regional scales. This variance in the composition of PM2.5 ensures that the estimates of the health burden, while reasonably accurate at large scales, cannot provide the basis for strong action locally. (Health Effects Institute 2004).



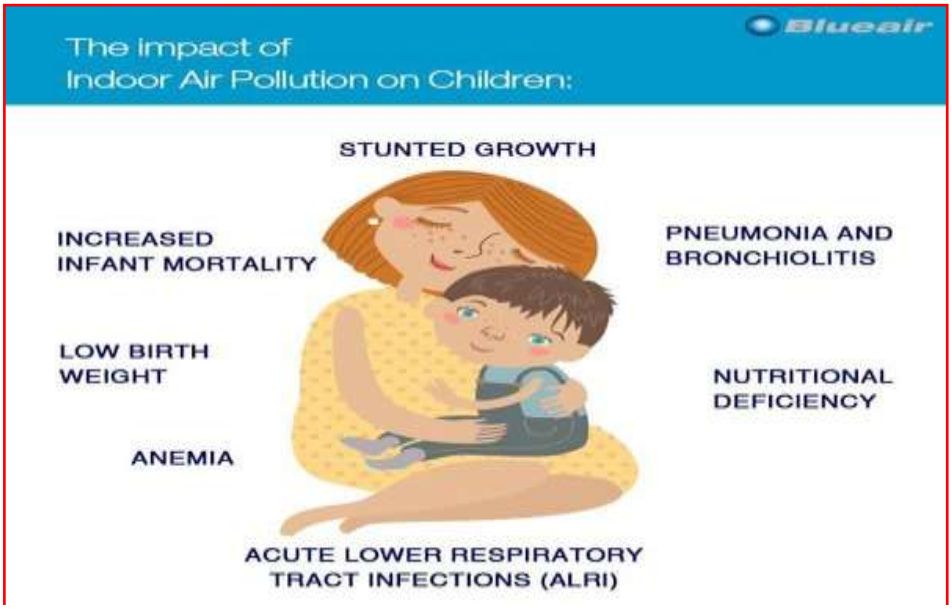
Rodrigo Romão et.al (2013), examined a study on the relationship between low birth weight and exposure to inhalable particulate matter. This study analyses the relationship between exposure to PM_{10} and low birth weight in the city of Santo André, São Paulo State, Brazil. The study included babies born to mothers' resident in Santo André between 2000 and 2006. Data on daily PM_{10} levels was obtained from the São Paulo State Environmental Agency. The study found that the prevalence rate of low birth weight was 5.9%. There was a dose-response relationship between PM_{10} concentrations and low birth weight. Exposure to the highest quartile of PM_{10} (37,50µg/m^3) in the third trimester of pregnancy increased the risk of low birth weight by 26% (OR: 1.26; 95%CI: 1.14-1.40) when compared to the first quartile. The same effect was observed in the remaining trimesters.[10]

Anna Merklinger-Gruchala (2015)conducted a study on Association between PM10 air pollution and birth weight after full-term pregnancy in Krakow city 1995–2009 – trimester specificity. The studies indicate that the higher maternal exposure to air pollution, especially with particulate matter during pregnancy, the lower the infant's birth weight. The aim of this study was to estimate entire pregnancy and trimester-specific exposure of pregnant women in the city of Krakow, southern Poland, to fine particulate matter [≤10 µg (PM10)], and to assess its effect on the birth weight of boys and girls separately. Maternal exposure to PM10 during the first trimester was negatively associated with birth weight separately in girls and boys, and the group of boys and girls combined. However, the PM10 exposure during the second and third trimester of pregnancy was not associated with birth weight.[2]

Health effects of PM in Household air pollution (HAP): -

- Around 3 billion people cook with biomass globally
- Over 4 million people die prematurely from illness attributable to HAP
- More than 50% of premature deaths due to pneumonia among children < 5 are caused by the PM inhaled from HAP
- 3.8 million premature deaths annually from non-communicable diseases including stroke, ischemic heart disease, Chronic obstructive pulmonary (COPD)and lung cancer are attributed to HA

Attempt to evaluate the primary and secondary outcome of pregnant women: -

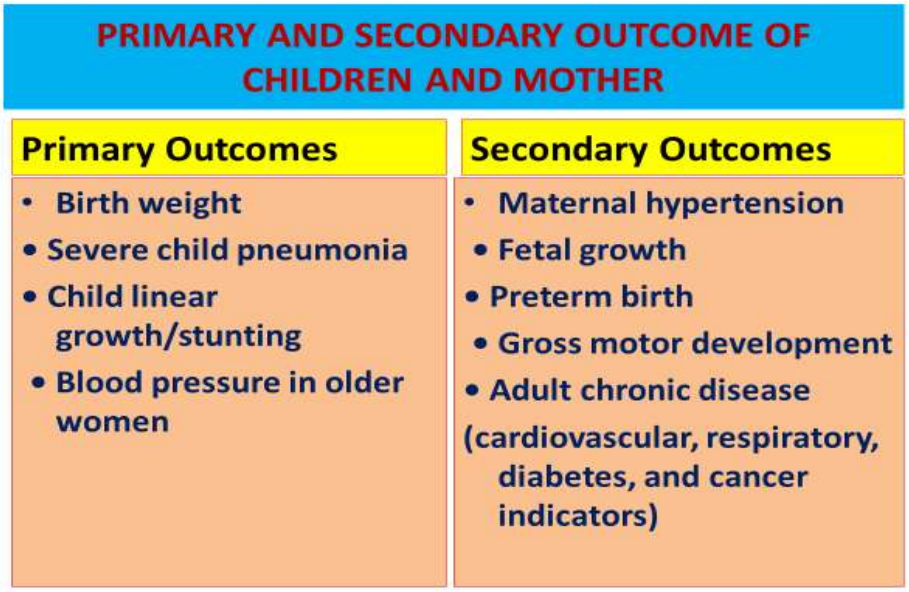


Air pollution & pregnancy outcomes: -

Associated adverse pregnancy outcomes

- First trimester miscarriages
- Still births
- Low birth weight
- Preterm births
- IUGR (intrauterine growth restriction)
  A condition in which a baby does not grow to normal weight during pregnancy.
- Decreased fetal head circumference – Congenital malformations

Primary and Secondary Outcome of Children and Mother: -



Different case study has been done on the impact of particulate matter ($PM_{2.5}$) and (PM_{10}) impact on birth weight of the child:

Ageo Mário Cândido da Silva et.al (2004), study on Low birth weight at term and the presence of fine particulate matter and carbon monoxide in the Brazilian Amazon: a population-based retrospective cohort study focus on an association between air pollutants from anthropogenic sources and pregnancy outcomes, little is known regarding the association between low birth weight (LBW) and exposure to emissions of biomass burning. The study found that the association between exposure to air pollutants and the risk of LBW was significant for the 4th quartile of $PM_{2.5}$ concentrations in the 2nd trimester (OR = 1.51, 95% CI = 1.04 to 2.17) and in the 3rd trimester, and for the 4th quartile of CO concentrations in the 2nd trimester only, in adjusted analysis.[1]

Roxana Khalili (2018) conducted a study on Early-life exposure to PM2.5 and risk of acute asthma clinical encounters among children in Massachusetts: A case-crossover analysis. The study found that associations between PM2.5 exposure and asthma clinical encounters among children at lags 0, 1 and 2 were close to the null value of OR = 1.0. Evidence of effect modification was observed by birthweight for lags 0, 1 and 2 ($p < 0.05$), and season of clinical encounter for lags 0 and 1 ($p < 0.05$). Children with low birthweight (LBW) (< 2500 g) had increased odds of having an asthma clinical encounter due to higher PM2.5 exposure for lag 1 (OR: 1.08 per interquartile range (IQR) increase in PM2.5; 95% CI: 1.01, 1.15). Conclusion Asthma or wheeze exacerbations among LBW children were associated with short-term increases in PM2.5 concentrations at low levels in Massachusetts.[11]

Seung-Ah Choe (2019) study on Association between ambient particulate matter concentration and fatal growth restriction stratified by maternal employment found that the association between air pollution and fatal growth restriction can be different across maternal working status. This study was to assess possible effect modification by maternal employment in the association between exposure to PM during pregnancy and fatal growth restriction.

To analysis the main issues and challenges of Pradhan Mantri Ujjwala Yojana (PMUY) launched by central Government: -

To address the health impact issue on women and child, central Govt. of India introduced uses of clean fuel in the rural areas called Pradhan Mantri Ujjwala (PMUY) with specific objectives to equilibrium the health status of women and child in urban and rural areas.

Pradhan Mantri Ujjwala Yojana (PMUY) launched on May 1st 2016 with the objective of

- Empowerment women and protecting their health.
- Reducing the serious health hazards associated with cooking based on fossil fuel.
- Reducing the number of deaths in India due to unclean cooking fuel.
- Preventing young children from significant number of acute respiratory illnesses caused due to indoor air pollution by burning the fossil fuel

According to Jain et al. (2018), although 58 per cent of rural households use LPG, access is skewed towards upper classes, with 69 per cent of General households using LPG against just 38 per cent of Scheduled Tribe households. Similarly, access to clean cooking energy is limited for the urban poor owing to the lack of affordability and documentation. Hence,

the strategy for access must ensure social inclusion of all marginalised groups regardless of caste, gender, and age. This necessitates a targeted context-based approach, region by region, to ensure equitable access across social groups.

The government's push to provide clean cooking fuel to every household has turned India into the world's second-largest LPG consumer whose demand is projected to rise 34 per cent by 2025, Active LPG consumers have grown at a compounded annual growth rate of 15 per cent - from 14.8 crore in 2014-15 to 22.4 crore in 2017-18.[14]

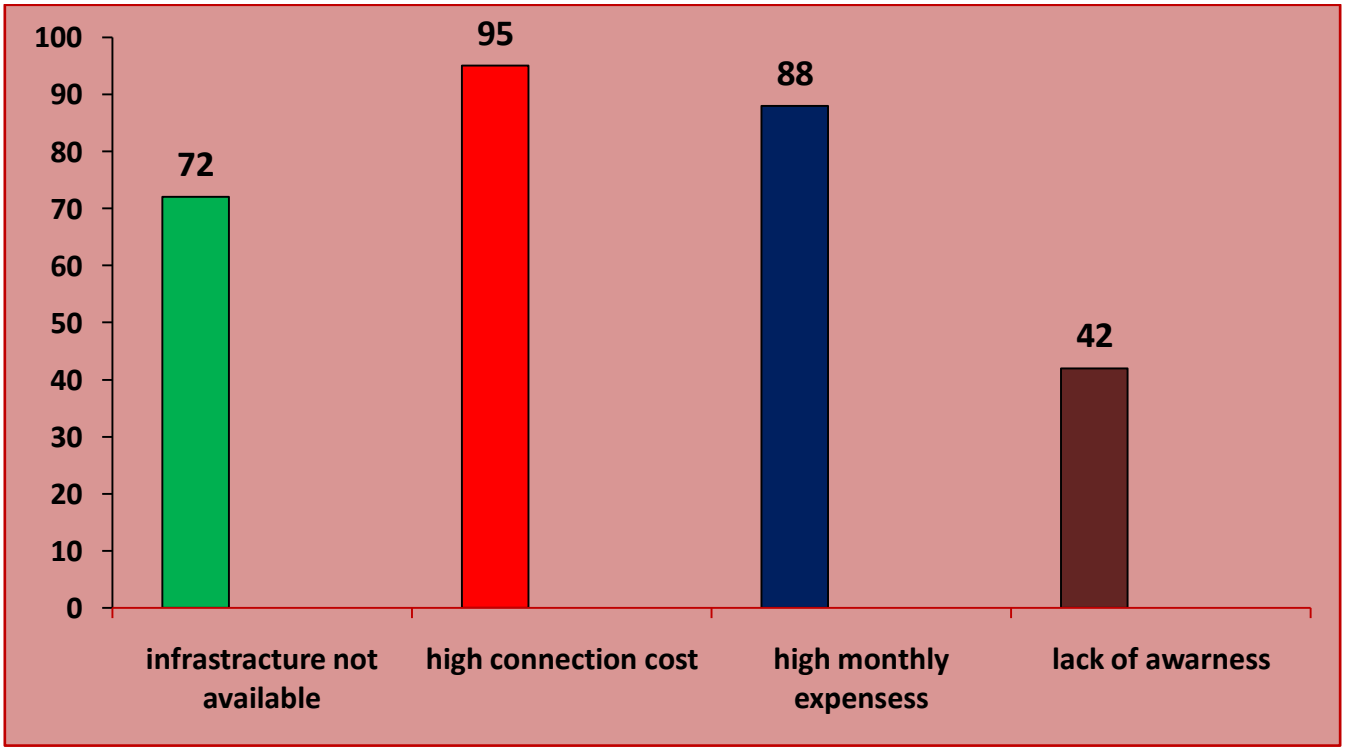
Challenge and issue face: -

Some of the six energy-deficient states (Bihar, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh and West Bengal) in India.: -

- As many as 95% of rural homes across six energy-deficient states (Bihar, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh and West Bengal) still use traditional fuel, such as firewood, dung cakes and agricultural waste for cooking, says a new.
- Only 14% households in rural areas across the six states surveyed used biogas, LPG (liquefied petroleum gas), electricity or natural gas as their primary source for cooking, according

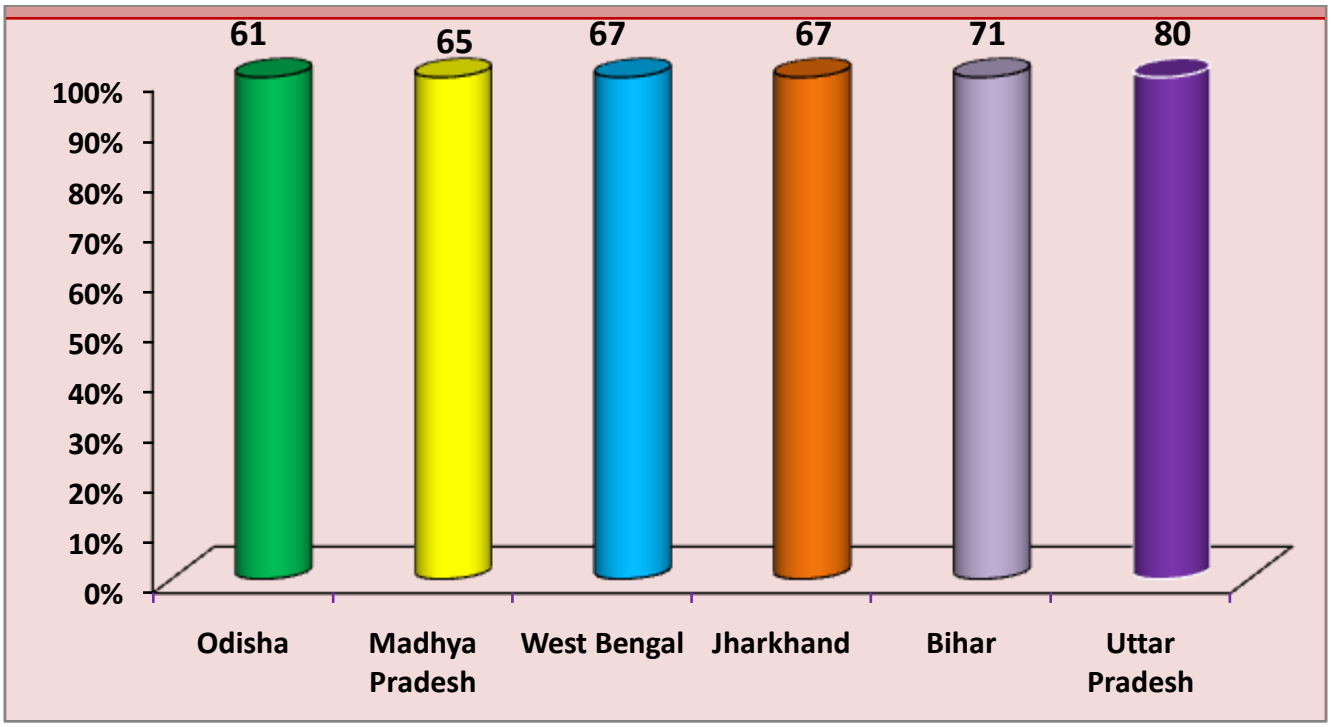
According to Clean Cooking Energy and Electricity–Survey of States (ACCESS) 2015.some issue for no LPG connection, Adverse health impact of smoke from chulha**,** and Health Benefits of LPG over Chulhaare given in the following figure which is a big challenge in these states.[18]

Issue for no connection of LPG: -



source: -ministry of stastic 2015

Adverse health impact of smoke from chulha:-



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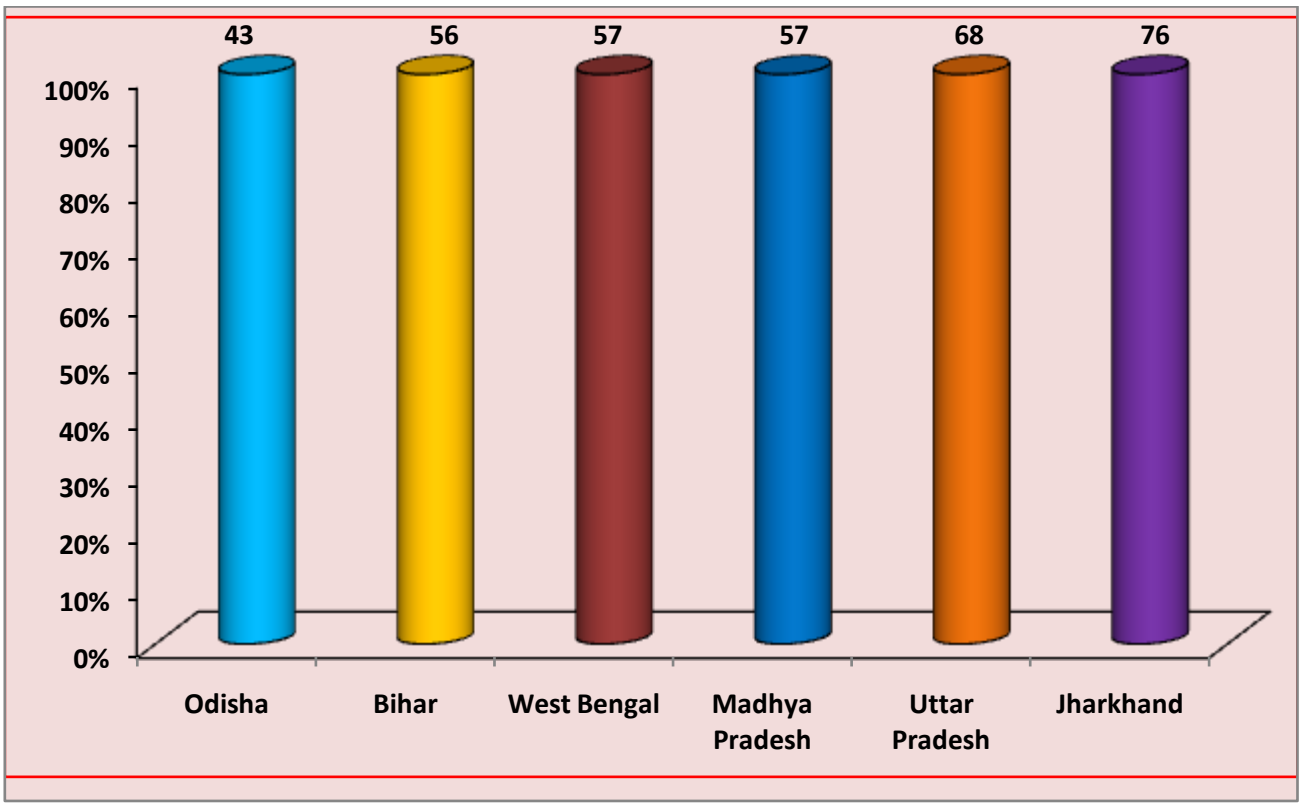
Health Benefits of LPG over Chulha: -



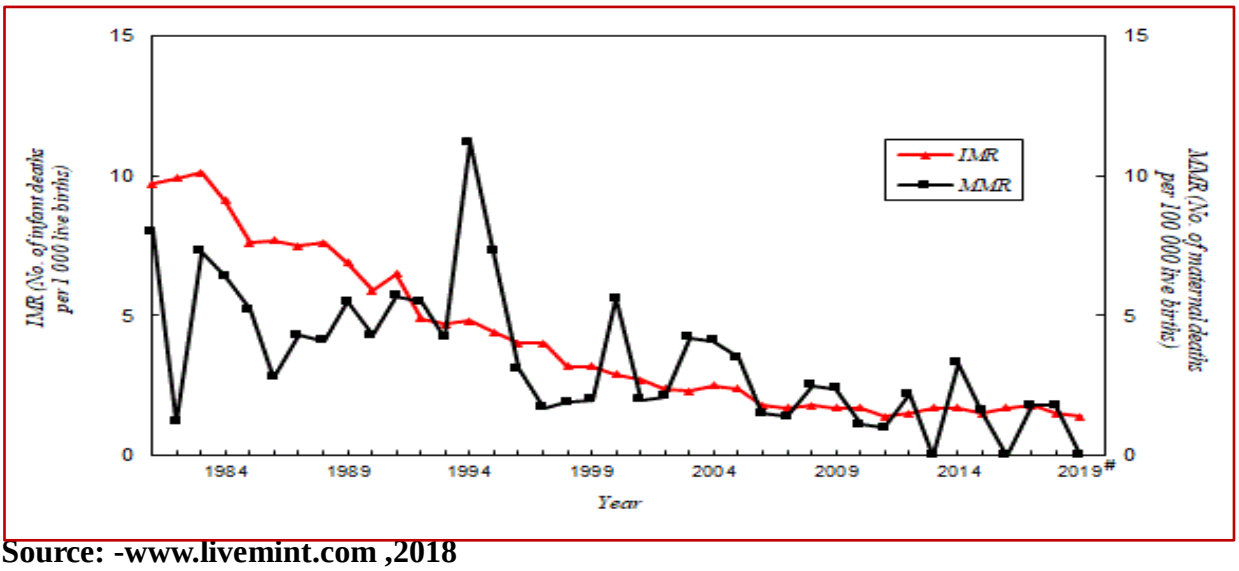
source: -ministry of static 2015

Current status of LPG revolution: -

Source: - Economic Time (ET) Bureau 2018

Current status of IMR and MMR status of India

After use the LPG the IMR and MMR status of India has been decreased. a report given below.Infant Mortality Rate (IMR) and Maternal Mortality Ratio (MMR), 1981 – 2019. The infant mortality rate has decreased from 9.7 per 1000 live births in 1981 to 1.4[#] in 2019 while the maternal mortality ratio has fluctuated between 0 and 11.2 per 100000 live births in the past 39 years.[15]



Source: -www.livemint.com ,2018

Conclusion: -

Socio economic status impacts both on health and policymaking. Hence it is ensuring that the upstream determinant and the downstream curative aspects are effectively addressed. Along with good nutrition clean cooking fuel can lead to increased birth weight in newborns. A healthy environment can develop a health thought which encourage a healthy life style can boost to improve a quality of life among women and children in our society. Further research is required for improving information on relationships between indoor air pollution and various health effects (e.g., increased mortality and morbidity risks)

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