iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** IX **Month of publication:** September 2020

DOI: https://doi.org/10.22214/ijraset.2020.31402

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IX Sep 2020- Available at www.ijraset.com

Socioeconomic Correlates of under-Five Mortality in Odisha

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Abstract: ***Prior study suggested that Socio-economic factors impact on child health and survival through the proximate determinants. The present study makes an attempt to examine the trends, patterns and the determinants of socio-economic factor affect Under-five mortality in the state of Odisha. The long term change of under-five mortality in Odisha was assessed by the annual publication of Sample Registration System (SRS) data. The Cox proportional hazard model was used for determine the socio-economic factor affecting of mortality on the fourth round the National Family Health Survey (NFHS) data. and finally Fairlie's decomposition technique was applied for identify factors affecting change in under-five mortality in two periods. The results suggest that low birth weight and female education play the dominant role for increasing the under-five mortality in Odisha. The disadvantage of health care facility is major cause of high under-five mortality in disadvantage districts (western, southern) of the Odisha. Considerably higher rate mortality in the area indicates that an unequal wealth quintile and different distribution use of resources by type of residence.***

Keywords: proximate determinants; Cox proportional hazard; Fairlie's decomposition; low birth; wealth

I. INTRODUCTION

Childhood is a significant stage of life and deprivation during this period can have a long-term adverse impact on the wellbeing of children. Reduction of under-five morality was one of millennium development goals, as children are the most important assets of a nation. The decline of under-five mortality is therefore not only desirable but also indicative of an improvement in general living standards. This improvement in child survival was associated with positive changes in socioeconomic status of people.

The under-five mortality rate (U5MR) is defined as the—probability of children death under age of age five expressed per 1000 live-births. In India, 2.1 million children die before reaching their fifth birthday. Half of these children die even before they are 28 days old, accounting for one-fourth global infant deaths. Of the 9.7 million child deaths worldwide annually, one-third occur in India. Even so, Indian children are still experiencing very high mortality risk compared with children in many other developing countries. The mortality rate for children less than five years of age is currently noted 50 per 1000 live births (National Family Health Survey, 2015–16).According to WHO (2015), the major causes of under-five death are prematurity, congenital sepsis, pneumonia, malaria, and birth complications. These conditions are related to socioeconomic factors, such as poverty, absence of education in mothers, and children born in rural areas.

The level of under-five mortality is one of the most revealing actions of how well as society meet the needs of its people, and that child mortality shows how well Governments distribute assailable resource for health education, food distribution, sanitation enhancement of the status of woman and other priorities in public spending. The International Conference on Primary Health Care held in Alma Ata in 1978 was the first global conference to mentioned that how child mortality can be reduced by the systematic development of a primary health care system. And ICPD held in Cairo in 1994 incorporates the reduction of maternal and child mortality.

U5MR varies largely across the states of India. The demographically less advanced states of Bihar, Madhya Pradesh, Uttar Pradesh, Rajasthan and Odisha have the highest levels of under-five mortality. Under-five mortality needs a closer look when it comes to Odisha because Odisha is among the EAG states that whose health condition very worse, due to bad socio-economic particularly in poverty. Odisha is also the most poverty-stricken state of India, with 47% of household living below the poverty line as against 43% in Bihar, 31% in Uttar Pradesh, 37% in Madhya Pradesh, 15% in Rajasthan and 26% for India as a whole (Arokiasamy, 2006). Similarly mortality situation in this state is relatively higher than the any other states. In Odisha, the infant mortality rate is 42 per 1000 live birth while under-five mortality rates are 50 per 1000 live births and in 2016 (SRS). The prior's studies found that under-five mortality is determined by the demographic and socio-economic factors. The socio-economic factors like that poverty, level of parental education, place of residence, occupations, income, and sanitation (source of drinking water and toilet used by a household) and demographic factors, such as women's age at birth of the children, birth order and birth interval, are the leading causes of children's under-five age of death.

One of the socio-economic determinants, mother's education is recognized as a powerful factor affecting child survival. Mother's education plays the dominant role for the children of enjoying better diets and better overall care than the children of non-educated mothers, and there is a strong inverse relationship between mother's education and under-five mortality.

The urban rural differences under-five mortality rate in Odisha has very high. The rural areas mortality rate is relatively higher as compared to the urban Odisha. Because the urban area occupied by greater availability of health care services, higher income and educational level, while rural Odisha, most of children's death occurs due to diarrhoea, fever, respiratory and dropsy. In urban areas 79 percent of the children age 12-23 months received all basics vaccination against six major childhood illness (tuberculosis, diphtheria, pertussis, tetanus, polio, and measles). The coverage of health care services including with immunization, safe delivery of birth is more developed in an urban areas than the rural area in Odisha.

From the above background, the present study attempts to examine the trends and analyse the determinants of socioeconomic factor affect Under-five mortality in the state of Odisha. Therefore, region wise differences in the patterns and determinates of Under-five mortality will provide valuable insight as to why under-five mortality rates are high in this states. And also identify factor affecting change the under-five mortality in last two decades.

II. DATA AND METHODOLOGY

A. Data

The data for the present study has been extracted from the various annual publications of Sample Registration system (SRS) and the National Family Health Survey (NFHS-4, 2015-16). The level, trends and regional differentials in under-five mortality have analysed from the SRS data. This source has been drawn the variation by sex and urban, rural differentials by the place of residence. The Sample Registration System was introduced as a pilot scheme in some selected Indian states in 1964–65 to generate reliable estimates of fertility and mortality at the national and state levels. It was converted into a full-scale system in 1969–70. Apart from this SRS bulletin, analytical study reports and the occasional paper published at half yearly intervals provides birth rates, death rates and also abridged life table for the states and India.

The second part of the analysis is based on the National Family Health Survey –III (2005-06) and IV (2015-16). The NFHS is a large-scale, cross-sectional, multi-round survey conducted in a nationally representative sample of households throughout India, under the Ministry of Health and Family Welfare, Government of India. In Odisha NFHS-III and IV, information was collected based on 1781 and 11,106 observations from the kid file for the last five years with the women age group of 15-49. All the woman surveyed were asked to provide complete birth histories including sex, date of birth, and survival status for each live birth; the analysis uses the birth history data. A total of birth occurred to the woman in Odisha in the last five year preceding the survey. The outcome variable 'under-five death' was assigned a value of 1 if the child died before 59 months and 0 if the child was alive at least until age 59 month.

1) *Outcome Variable:* We used the information on birth in five year preceding survey data from NFHS- 4 in the analysis. Mortality under the age of five years has taken as dependent variable. Our outcome variable 'under-five' was assigned a value of 1 if the child died before age 59 months and 0 if the child was alive at least until age 59 months.
2) *Independent variable:* The number of studies has highlighted the role of socioeconomic, demographic and community variables in explaining under-five mortality in various countries (Caldwell 1979; Caldwell and McDonald 1982; Trussell and Hammerslough 1983; Mosley and Chen 1984). The socio-economic variables included in the analysis were household wealth index (poorer; middle; richer and richest), mother's education (no education; primary; secondary and higher), mother's exposure to mass media (not exposed; at least one exposed), place of residence (urban; rural), caste (Schedule Castes; Schedule Tribes; OBC and others) of the household head. The bio-demographic variables included in the analysis were birth order (first birth order; second; third and fourth or more), mother's age at birth of the index child, sex of the child, size of the baby at birth and BMI status of woman (less than 24.6; normal and more than 24.6). These variables have a significant association with the under-five mortality (Gubhaju 1985; Sastry 1996; Manda 1999; Kembo and Ginneken 2009; Poel, O'Donnell, and Doorslaer 2009; Sastry and Burgard 2011). We also used the health care utilization variables for example that tetanus vaccinations (not taken; taken), place of delivery care (home; institutional), assistant at delivery (doctors/ nurse/midwife: others) and antenatal care (not visit: visit). The health care utilization factors strongly associated with long time child survival (O'Donnell et al. 2008). Another important determine of region wise estimate of under-five mortality (Claeson et al. 2000; Subramanian et al. 2006; Saikia et al. 2011). Accordingly we divided in Odisha into four regions (western; northern; southern and central) based on NSS region classification.

B. Statistical Methods

All the data analysis has performed using Stata 14 (version). Some variables included in the study were recorded to make a new variable. All the variables were made categorical. Frequency and cross-tabulation table was generated from data set through descriptive statistics.

For the survival Cases analysis, Cox is considered as the better measure in respect to other methods such as life table in which we can find the survival scenario in case of equally divided constant age intervals, which is being improvised in Kaplan-Meier estimate with varying age interval or variable failure timings. Cox Proportional hazard model is a semi parametric model which provides more powerful estimation than any non-parametric model in any case. And more it consists the liberty to any non-parametric model to the number of variables. Cox proportional model is defined as-:

$$hi(tiXi) = h_0(t)e\sum n\ i=1\ \beta\ ixi$$

Where $h_0(t)$ is base line hazard which can be approximated through by any distribution such as exponential or Weibull distribution but they will provide the similar results for the same data due to that property Cox regression is considered as semi-parametric model. And for the value if relative we did not have to defined the baseline hazard certainly we can go for the results by using the $e\sum n\ i=1\ \beta\ ixi$ for given time t to occurring the event.

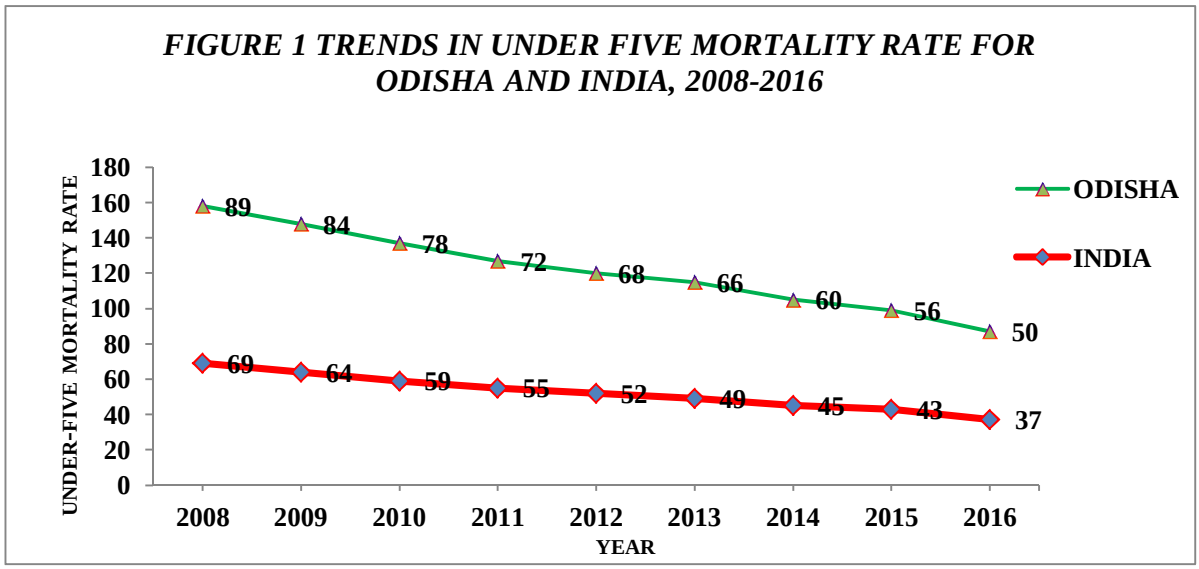
For the association of outcome variable with the independent variable, p-value has calculated. P-value less than 0.05, represents a statistically significant association between the outcome variable and explanatory variable. The confidence interval was set at 95% to estimate the range of risk. In this study, an objective is how the socio-economic factor contributes the under-five mortality by the two periods NFHS-3 (2005-06) and NFHS-4 (2015-16). This perspective used the extension of the Blinder-Oaxaca technique (Fairlie 2005) that is appropriate for binary models to decompose the factors affecting in under-five mortality in two periods. Used the Fairlie command available in STATA -14 and 12886 samples of two periods to calculate their percentage. The life table method used for the estimate the prevalence of under-five mortality rate. The district level infant and under-five mortality have been estimated by statistical software STATA using the 'syncmrates' syntax.

III. RESULTS AND DISCUSSION

A. Trends in Under-five Mortality for Odisha and India

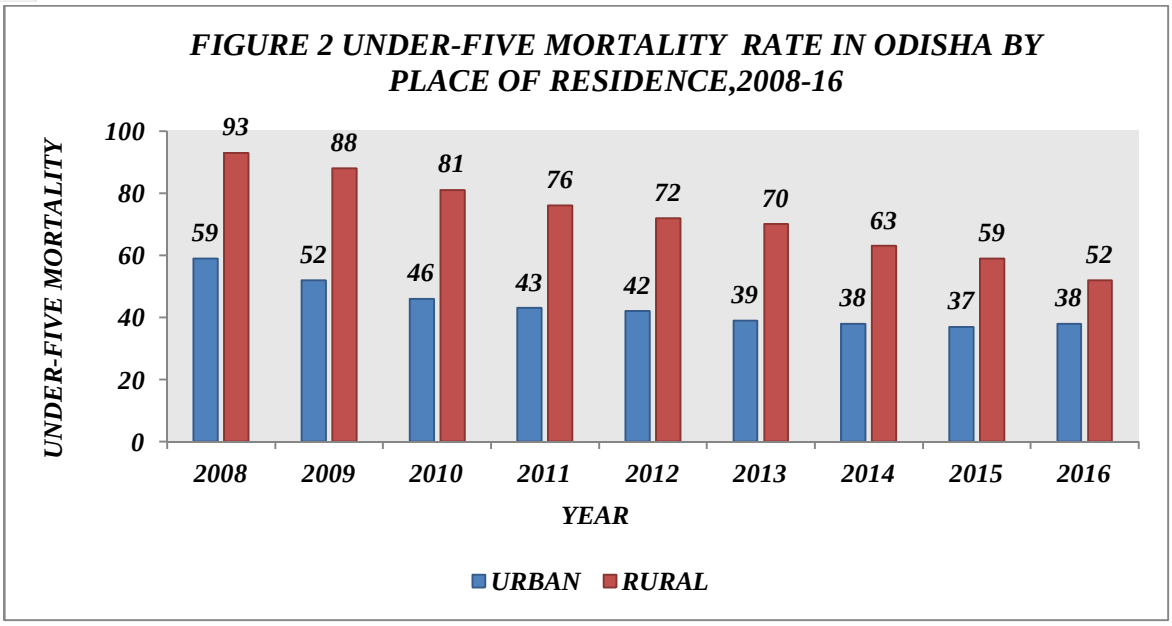
Figure 1 depict about the under-five mortality rate over the last 8 years in India and Odisha. The under-five mortality rates in India continuous declined over the years.

FIGURE 1 TRENDS IN UNDER FIVE MORTALITY RATE FOR ODISHA AND INDIA, 2008-2016



Source: Annual Reports Sample Registration System, 2009-17

Odisha had the highest under-five mortality rate in 2008; it was far more than national average. The decline of under-five mortality from 2008 to 2016 is 40 percent. A rapid decline has experienced in mortality rate in Odisha from 2008 but after 2012, the pace of decline slowed down. A common feature in the pace of decline in mortality rate for Odisha and India is that in general, it has been considerably slow after 2012. It is more or less constant indicating a stage of clear plateauing.

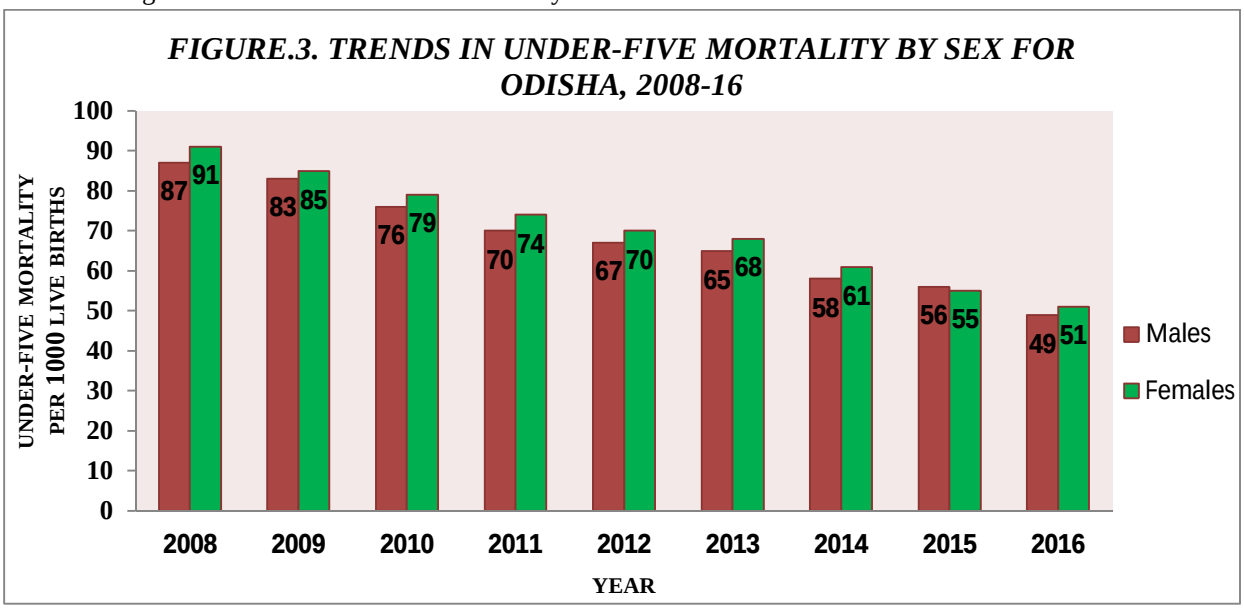


Source: Annual Reports Sample Registration System, 2009-17

Figure 2 presents the under-five mortality rate by place of residence for Odisha. It's found that the under-five mortality rate difference in rural and urban areas has very high. But the both urban and rural area declined the mortality rate simultaneously over the time year. In 2008 the urban and rural mortality was 93 and 59 respectively, and then it's started to decline and to reach 59 in urban and 39 in the rural area in 2015 respectively. But 2016 suddenly 1 percent increase the rural mortality from the earlier (2015) decades.

B. Trends in Under-five Mortality by Sex for Odisha

Fig.3. Show that the under- five mortality for males and females in Odisha from 2008 to 2016.

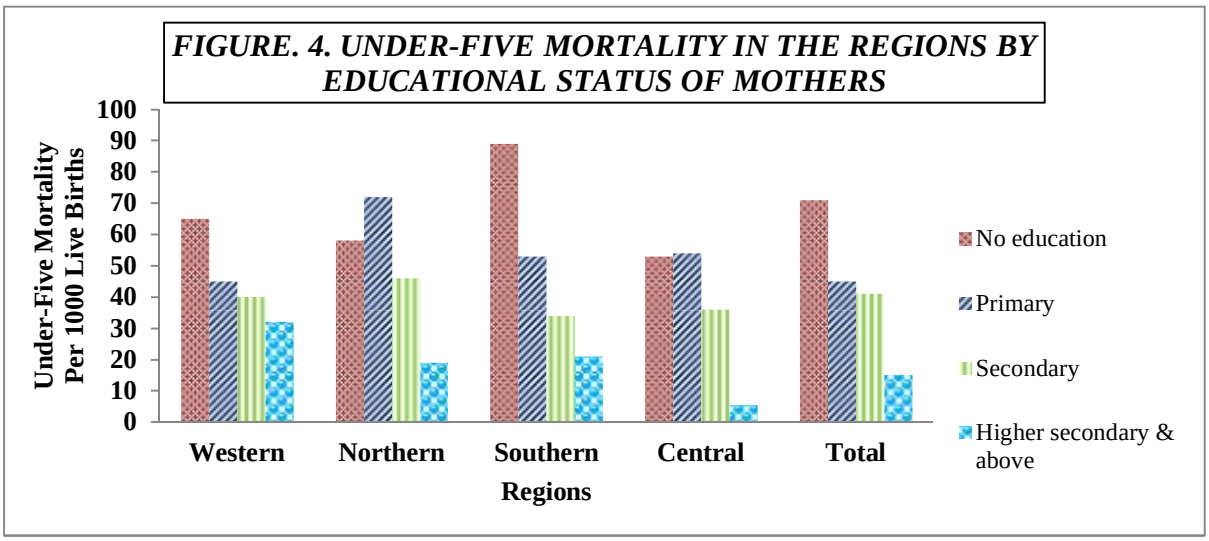


Source: Annual Reports Sample Registration System, 2009-17

Both Males- Females under-five mortality has declined over the time years, simultaneously. The sex wise gap not much found very widely from 2008 to 2016. But the females' mortality was slightly higher than males' mortality. In 2016 estimated the under-five mortality for males-females 49 and 51 respectively.

C. Regional level analysis of Under-Five Mortality in Odisha 2015-16

The state of Odisha is a divide in four region namely Northern, Southern, Central and Western regions. The analysis of under-five mortality carried out at regional level. **Table 1** shows the estimate of under-five mortality by socio-demographic characteristics of the study population. It has found that bio-demographic factor birth order plays a vital role in under-five mortality. The life table estimated under-five mortality 43 per thousand live births had taken the place of the first birth order. Then it has started to decrease and mothers had given more than four birth order again start to increase the risk of under-five death. In the southern region, under-five mortality is highest by first birth order as compared to the other regions, followed by northern, western and central part of Odisha. In Odisha the death of males child was relatively higher than female babies. But region wise sex determinant mortality was various across this state. The size of the baby less than average is always a higher risk of infant death. It has found that the under-five mortality rate is 63 for a less than average size of baby and 20 for a higher than average size of the baby. The highest mortality was taken place in the western region (100) by the less than average size of the baby, followed by northern, southern and central region. Another hand, the higher risk of under-five mortality by the more than the size of the baby, has found in the southern part of Odisha.



Source :National Familiy Health Survey ,2015-16

Among socio-economic variables, mother education has a strong relationship with under-five mortality and child survival. The under-five mortality is highest 70 for the children of illiterate mothers and 17 for the children whose mothers has higher educated. Fig (4) show adjusted under-five mortality by the different level of mother's education. The mortality minimum has found in central regions, for the mothers educated till high school above. But the northern region has not much more difference between illiterate mothers and primary education.

Table 1 Estimated of Under-Five Mortality on Socio-Economic Demographic Factors in Regions Wise of Odisha.

BIRTH ORDER	Western	Northern	Southern	Central	Total
1	44	46	83	27	43
2	31	37	60	33	40
3	55	63	53	78	63
4	72	84	61	86	70
Sex of the child					
Male	42	46	78	43	51
Female	47	52	54	34	44

Child weight at birth					
Less than 2.5kg	100	85	81	52	63
More than 2.5kg	19	23	48	20	20
Place of residence					
urban	49	35	26	16	23
rural	44	52	73	42	49
Mothers educations					
No education	65	60	89	53	71
Primary	45	72	53	54	45
secondary	40	46	34	36	41
Higher secondary	32	19	21	5.5	15
Exposure to mass media					
Not exposed	70	83	88	42	61
exposed	35	34	51	37	33
Wealth index					
Poorest	51	66	90	49	65
Poorer	47	36	71	45	50
Middle	41	40	24	32	33
Richer	26	41	14	14	20
Richest	21	29	22	9	15
Place of Delivery Care					
Home	51	68	93	47	63
Institutional	42	43	57	34	37
Tetanus vaccination					
Taken	27	31	38	22	23
Not taken	84	31	67	21	40
Caste					
SC	59	40	62	29	39
ST	39	48	91	57	54
OBC	40	48	51	39	37
Total U5MR	45	49	67	38	48
No of dead children	82	112	203	114	511
No of birth	2004	2548	3191	3363	11106

Wealth index is another essential differentials factor of under-five mortality. The highest mortality is observed (65) for the children whose families are belonging to poorest quintile and the lowest is (15) under-five mortality among the children whose are belonging to richest quintile. The socio-economic condition in the southern region is deplorable, thus the under-five mortality rate relatively higher than the other part. Exposure to mass media (radio, newspaper and television) also carries a significant association with under-five mortality. Those mothers engaged at least one exposure to mass media mortality rate has relatively lower than the not expose to any mass-media.

Medical attendance (doctor, nurse or skilled birth attendant present) at birth is associated with a large reduction of under-five mortality, especially in the poor states of Odisha. The southern region mortality rate has relatively higher than the others due to birth in home delivery. On the reverse picture has found in the central regions. The tetanus vaccination plays the dominant role in increasing the chance of survival of the children. According to NFHS-4 report total of 40 per thousand children death without taken the tetanus vaccination. The vaccination coverage relatively higher in the central region was followed by northern and western region. Thus, the chance of survival of the children's was relatively higher in the central part of the Odisha.

D. Determinants of Under-five Mortality Rate in Odisha

Table 2 presents the results of unadjusted and adjusted hazard ratio of under-five mortality using Cox Proportional Hazard Regression Model for Odisha. After fitting under-five mortality gets the independent variable birth order, the result suggests that the first birth order as the reference category. The children of second birth order were reduced the risk of death 3 percent as compare to the first birth order. For the third birth order risk of death is1.2 times higher with respect to the reference level with 95% confidence interval from0.790 to 2.00 at significant state. For consideration of maternal age less than 20 years of maternal age as reference level, we get the risk of children deaths lowered by 75 percent among children whose mothers received higher education compared to mothers without any formal education.

Coming to the socio-economic factor with consideration of schedule caste as a reference level, the result suggests that relative risk of children death for schedule tribe people 1.31 time higher compare to the other categories at significance level. The risk of mortality in urban Odisha has relatively lower as compare to rural Odisha. Those mothers have exposed at least one mass media reduce the 48 percent of children death as compared to non-exposed of mothers with respect to 95 % significant interval. For considering to wealth quintile , those children's born in high economic background family the mortality risk has lower than the low economic background family.

The health care utilization one of the important for reduced risk of children death. The results suggested that the risk of under-five mortality was reduced by 54 percent among those children whose mothers delivered at institutional with the assistance of health personnel. The insignificant result tetanus vaccination and antenatal care suggested that reduced the risk of children death during the pregnancy at 32 percent and 38 percent respectively.

The adjusted under-five mortality result also suggested that the demographic factors of mother more than 4 birth order 2.04 times higher risk of children death as compared to second birth order. Similarly, mother age of 20-29 years reduced the 77 percent of children with respect to significant value at 95% confidence interval limit 0.75 to 0.68. Female births had a reduced risk of 18 percent compared to male births in the states of Odisha. The place of institutional delivery has one of the protected areas for a long time children survival. The result suggested that 20 percent of relative's risk reduced hazard mortality by the institutional delivery with the help of health personnel. On the other hand, antenatal care decreased the 10 percent of hazard risk of under-five mortality.

Table 2 Hazard ratio (HR) of Under-five mortality by socio-economic, bio-demographic and health care for Odisha,(2015-16)

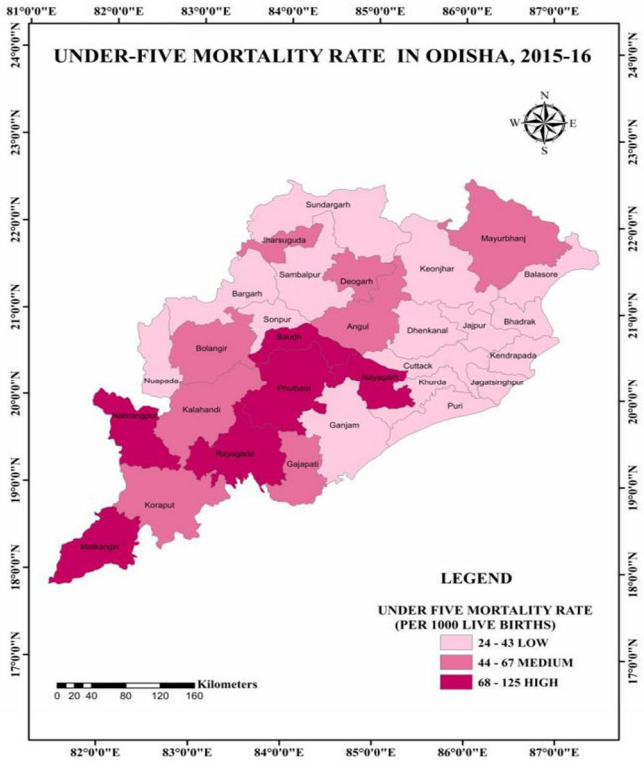
	Unadjusted			Adjusted		
Variables	Haz. Ratio	P	[95% Conf.]	Haz. Ratio	P	[95% Conf.]
Maternal bio-demographic factor						
Birth order						
1®						
2	0.971	0.881	(0.657 -1.432)	1.735	0.10	(0.858 - 3.410)
3	1.260	0.332	(0.790 - 2.008)	2.177	0.066	(0 .928 - 4.93)
4	2.213	0.00	(1.469 -3.33)	2.047	0.000	(0.762 - 5.123)
Maternal age at birth child						

Less than19®						
20-29	0.480	0.000	(0.210 - 1.097)	0.230	0.009	(0.075 - 0.689)
30-39	0.647	0.312	(0.277 - 1.506)	0.275	0.038	(0.081 -0 .928)
40-49	1.511	0.404	(0.573 - 3.983)	0.432	0.274	(0.095 - 1.944)
Sex of the child						
Males®						
female	0.884	0.43	(0.651 - 1.200)	0.820	0.437	(0.492 - 1.352)
Maternal education						
No schooling®						
primary	0.240	0.00	(0.124 - 0 .460)	0.496	0.10	(0.199 - 1.230)
secondary	0.429	0.00	(0.310 - 0.593)	0.818	0.556	(0.419 -1.596)
higher	0.257	0.08	(0.094 - 0.699)	1.407	0.00	(0.351 - 5.628)
Size of the baby at birth						
Less than average®						
average	0.274	0.252	(0.465 - 1.222)	0.784	0.48	(0.398 - 1.540)
more than average	0.463	0.00	(0.310 - 0 .691)	0.422	0.00	(0 .236 -0.753)
Nutritional status of woman						
Less than®						
normal	0.48	0.79	(0.743 - 1.477)	1.796	0.056	(0.984 - 3.274)
overweight	0.665	0.179	(0.366 - 1.205)	1.753	0.258	(0.662 - 4.637)
Socio economic factor						
Caste group						
Schedule cast®						
schedule tribe	1.312	0.00	(0.870 - 1.979)	0.802	0.00	(0.409 - 1.573)
OBC	0.855	0.49	(0.548 - 1.333)	0.726	0.368	(0.362 - 1.456)
others	0.873	0.618	(0.512 - 1.488)	0.994	0.989	(0.421 - 2.346)
Place of residence						
urban®						
Rural	2.105	0.00	(1.217 - 3.639)	1.966	0.10	(0.754 - 5.122)
Exposure to mass media						
Not exposed®						
At least one	0.522	0.00	(0.384 - 0.708)	0.769	0.383	(0.426 - 1.387)
wealth index						
poorer	0.653	0.02	(0.456 - 0.935)	0.705	0.014	(0.459 – 1.025)
middle	0.338	0.00	(0.196 - 0.580)	0.23	0.680	(0.156 – 1.052)
richer	0.157	0.00	(0.057 - 0.425)	0.254	0.58	(0.158 – 0.758)
richest	0.230	0.01	(0.073 - 0.726)	0.140	0.000	(0.120 – 0.254)
Health care utilization factor						
Tetanus vaccinations						
Not taken®						
Taken	0.725	0.487	(0.293 - 1.794)	1.428	0.621	(0.347 - 5.867)
Place delivery care						
home®						
institutional	0.465	0.00	(0.328 - .657)	0.802	0.05	(0.305 - 2.105)
Assistance at delivery						

Others®						
Doctors/nurse/midwife	0.481	0.00	(0.338 - .684)	1.548	0.441	(0.509 - 4.700)
Antenatal care						
Not visit®						
Visit	0.627	0.135	(0.347 - 1.156)	3.905	0.10	(0.532 -28.66)

E. District Wise Estimates of Under-five Mortality Rates in Odisha

For a better understanding of the variation in Under-five mortality in the state of Odisha, this section presents the district wise estimates of under-five based on the last NFHS report 2015-16. The estimates have obtained from the NFHS-4 data (Table: 3) of using 'Syncmrates' syntax by statistical software of Stata. It was well known that there are regional variations within the states also hence the estimates of under-five mortality rates have presented for the smallest geographical level, i.e., for the district level as well as the regional level for the state of Odisha.



Map no. 1 Under-five Mortality Rate in Odisha, 2015-16

The map-1 shows that the southern region had a higher under-five mortality rate as compared to the other three of the state. It is worthwhile to mention here that the central and northern part of Odisha has a more developed region in the state followed by western and southern region, but the mortality levels in a northern and central region do not differ significantly. But if we see the mortality scenario in southern part than it's viewed that three districts in this zone extremely difference from the other district. These three districts are Malkangiri (124), Rayagada (104) and Kandhamal (92). Among the ten districts of western Odisha, only one district of Jharsugada (46) has fallen moderate under-five mortality zone, but the remaining districts have fallen low categories in the under-five mortality. These districts are Sambalpur (38), Bargarh (41), Nuapada (33) and Sundargarh (40).The under- five mortality in various district of the central region varied from a highest of 125 to lowest of 24 givining an overall value for the region as 40. The only one district Nayagarh (74) has highest mortality in this zone. Remaining other district are fallen range 24 to 43 in eight district namely Cuttack (24), Jagatsingpur (42), Kendrapra (32), Jaipur (39), Puri (43), Khurdha (35), Bhrdhak (40) and Balesore (27).

Table 3 District variation Under –Five Mortality Rate in Odisha, 2015-16

S.L NO	DISTRICT	U5MR	S.E	95%CI
1	ANGUL	67	0.015	(.038 - 0.095)
2	BALANGIR	51	0.016	(0.019 - 0.082)
3	BALESHWAR	28	0.009	(0.010 - 0.045)
4	BARGARH	42	0.041	(0.015 - 0.067)
5	BAUDH	87	0.017	(0.054 - 0.119)
6	BHARDAK	40	0.012	(0.017 - 0.062)
7	CUTTACK	24	0.008	(0.009 - 0.039)
8	DEBAGARH	46	0.011	(0.026 - 0.070)
9	DHENKANAL	42	0.012	(0.018 - 0 .064)
10	GAJAPATI	55	0.012	(0.031 - 0.077)
11	GANJAM	34	0.009	(0.015 - 0.051)
12	JAGATSINGPUR	43	0.012	(0.018 - 0.067)
13	JAJPUR	39	0.011	(0.016 - 0.061)
14	JHARSUGUDA	46	0.011	(0.023 - 0.066)
15	KALAHANDI	51	0.012	(0.027 - 0.075)
16	KANDHAMAL	92	0.026	(0.040 - 0.143)
17	KENDRAPARA	33	0.010	(0.013 - 0.052)
18	KENDUJHAR	51	0.013	(0.028 - 0.080)
19	KHORDHA	36	0.018	(0.0002 - 0.069)
20	KORAPUT	46	0.016	(0.013 - 0.077)
21	MALKANGIRI	124	0.034	(0.058 - 0.190)
22	MAYURBHANJ	49	0.011	(0.027 - 0.071)
23	NABARANGPUR	78	0.015	(0.047 - 0.107)
24	NAYAGARH	74	0.034	(0.007 - 0.140)
25	NUAPADA	34	0.034	(0.017 - 0.049)
26	PURI	43	0.043	(0.020 - 0.066)
27	RAYAGADA	105	0.019	(0.066 - 0.141)
28	SAMBALPUR	38	0.011	(0.018 - 0.062)
29	SUBARNAPUR	38	0.038	(0.015 - 0.060)
30	SUNDARGARH	40	0.010	(0.019 - 0.059)

F. Decomposition of Factor Affecting in Under-Five Mortality in Odisha

Table (4) presents the detailed decomposition of the two-time period in under-five mortality by the exposure variables, for the better understanding multiplied the coefficient value by the 100. While the positive covariate value indicates that the contributed to increasing the under-five mortality, the negative value contribution of a covariate (e.g., birth order) indicates reducing the risk of mortality.

Table 4 Decomposition of Factors affecting Under Five Mortality.

Covariates	contribution	P value	Standard Error
Birth order	-19.68	0.218	0.0035
Age at mother	-0.56	0.707	0.0003
Sex of the child	-3.76*	0.1	0.0007
Child weight at birth	4.18*	0.1	0.0005
Nutritional status of the woman	-3.68	0.785	0.0029
Place of residence	-13.14**	0.01	0.0012
Mother education	-4.20***	0.000	0.0031
Caste group	-4.56	0.545	0.0016
Religion	-9.29	0.399	0.0024
Wealth index	-0.25	0.871	0.0003
Mass media	3.56	0.748	0.0024
ORS knowledge	23.26**	0.03	0.0028
Caesarean birth	13.29	0.904	0.0018
Antenatal care	-4.24*	0.1	0.000
Assisted by health personal	75.38**	0.01	0.0069
N of obs G=0	=	1723	
N of obs G=0	=	10743	
Pr(Y!=0G=0)	=	0.06674405	
Pr(Y!=0G=1)	=	0.04458717	
Difference	=	0.02215688	
Total explained	=	0.01339969	

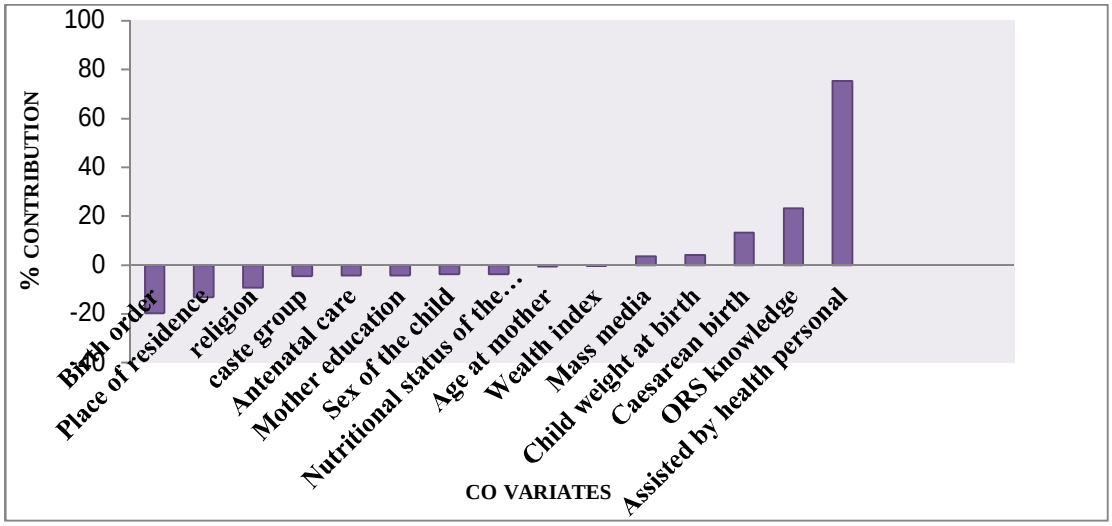
The total contribution of under-five mortality on different factors affecting time periods = (Total Explained/Difference)*100
= 60.47%

Note: *** p< 0.01, ** p< 0.05 & * p< 0.10

Result suggests that total 60% percent contributed two-time period of NFHS report in under-five mortality was explained by the differences in the distribution of exposure variables. The result suggested that a mother‘s age at birth, wealth index played a negligible role in reducing the under-five mortality risks (Figure (5). The significant contribution of reducing the U5MR is birth order and place of residence from NFHS-3 to NFHS-4. The contribution of child weight at birth, ORS knowledge, mass media, and health personal increasing the risk of mortality was overwhelming. The decomposition result clearly points out that the how different socio-economic factor reducing or increasing the under-five mortality rate from the past two decades.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IX Sep 2020- Available at www.ijraset.com

Fig.5. Percentage contribution of each covariate in under-five mortality risk in Odisha, National Family Health Survey 2005– 06 and 2015–16



IV. CONCLUSION

The under-five mortality is one of important indicators of the socioeconomic wellbeing of a society. It is an outcome rather than a cause, and hence it directly measures the results of distribution and use of resources. Considerably higher rate mortality in the area indicates that an unequal distribution of resources by type of residence. And it also severely impacts on socio-economic development. This exercise revealed that the contribution of the under-five mortality rate was very high in post NRHM (2005-12) period after that it has been started to decline. The decline the mortality over the periods it is indicating the stage of plateauing. Other hand the unequal distribution resource and wealth index widening the gap between rural-urban mortality in Odisha. Substantial higher mortality was found disadvantages district of rural Odisha like Malkangiri, Rayagada, and Kandhamal as compare to socioeconomically advanced district e.g.Puri, Khordha.The difference between male-female under-five mortality both rural and urban not much found significantly over the past four decades.

One of the main objectives of this study to examines the role of socio-economic and bio-demographic factors as determinants of the under-five mortality in Odisha using a Cox proportional model that takes into account the cause of death. One of the important steps towards achieving a reduction of under-five mortality is to carefully understand its major determine the health status of young children as study reveals that the various factors which determine the health status of the child improves water, sanitation, education status, housing condition, drinking water facilities.

The demographic factors also need scrutiny as there is still a lot to be understood on the possible relationship between demographic factors and child survival outcome. The bio demographic factor like Age of the mother at children born, birth order have significantly effects on the new born babies in all the regions. The risk of death is very high for birth with the higher order and having a shorter interval. Cox proportional Hazard model indicates that the place of delivery and the antenatal care are the most important factors affecting under-five mortality risks, and their strong, consistent effects tend to persist even after the introduction of education as a control. It appears that, the maternal age and maternal education are strongly related to the under-five mortality, because higher the mother age there are more chances that mother is educated, which has reduced the mortality. The mortality rate has relatively higher at mother age of below 19 than the age of 25-35 years. Because the higher age of the mother has more experienced and better take care of their children. Immunization of the pregnant women against tetanus indicates a substantial effect in reducing under-five mortality in the Odisha. It has observed that antenatal care should be more comprehensive rather just providing TT injection to pregnant mothers especially, avoiding under-five mortality. This study also reveals that a higher rate of under-five mortality taken place home delivery carried out by the untrained health personnel worker like Dai and aged woman.

Another major objective of the study is the district wise analyses of under-five mortality. Among the four regions (Western, Northern, Southern and Central) of Odisha, the southern part has very high under-five mortality. Northern and central regions show a similar level of under-five mortality. The risk of death is very high for the higher birth order. The western and southern region of Odisha the birth orders are relatively higher than the others part of the region, which is lead to the high under-five mortality.

In the central part of Odisha, people are more advances like close to mass media, better knowledge of child health and also the standard quality of life (improve drinking water, sanitation, and electricity) –all are factors leads to lower rick of under-five mortality. In some district of the southern part such as Malkangiri, Rayagada, Kandhamal are health care utilization facility very worse condition than the northern district like Sundargarh, Jharsugada. The disadvantage of the health care facility is the major cause of high under-five mortality in this area.

As under-five mortality rate in Odisha is at a high level, necessary policies and programme intervention have to develop to tackle these factors. Health education programme should be designed for the families who have experienced under-five mortality so that the further risk of death might be substantially reduced. Health care intervention programmes should be a focus on uneducated mothers whose children have all the higher risks due to poor health care utilization. Social policies also attempting to promote early initiation of mother feeding and utilization of prenatal care could make a significant contribution to the reduction of under five year mortality in Odisha (Arulampalam et al., 2006). Young mothers at high parity, those mothers had high birth order and mothers who had suffered child loss before are the vulnerable to excessive child mortality. This perspective they could be promoted through the mass media, particularly radio, which has reached most of the families, as well as education in the schools. This type of policy implication would be a support for both the socio-cultural environment and the general public becoming more supportive of early initiation of mother-feeding and with increased understanding of the benefits of prenatal care to the new-born babies.

A. Author's Contributions

I am solely responsible for the conception and design of the study. I fully and independently both carried out of the empirical analysis and interpreted the results of the manuscript. In addition, I am also fully responsible for any concept and ideas within the paper. I read and approved the final manuscript.

B. Authors' Information

The author is a MPhil Researcher in population studies in IIPS.

C. Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not for-profit sectors.

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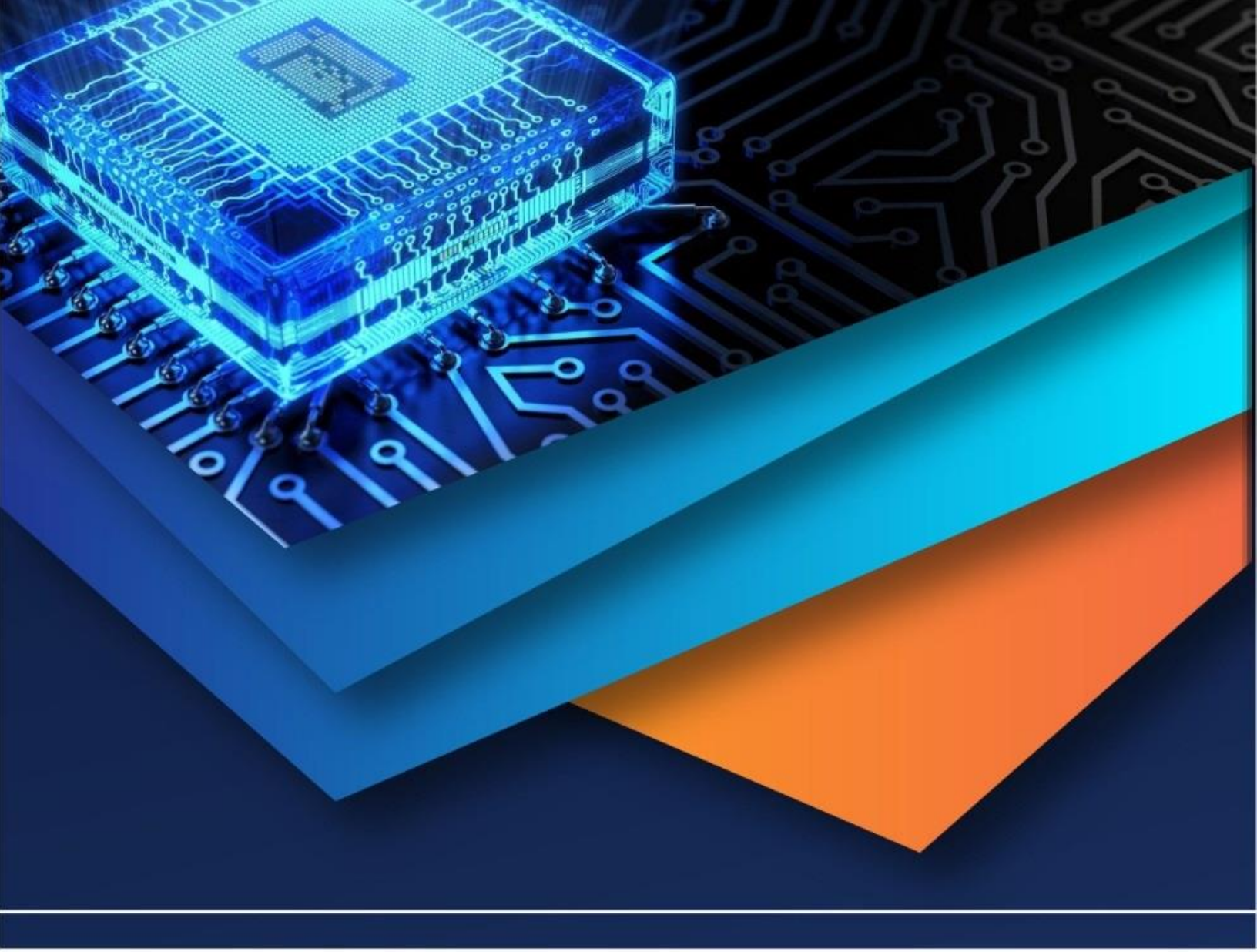

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