



## Impact of population growth: A progress or regress

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### Abstract

The fast-growing population is putting an implausible impact on environment, economy and society. It affects every country in a different way. Developed countries are affected less as compared to developing and undeveloped countries. The growth of population demands larger for the resources. The developed countries having adequate resources utilize the population for its betterment and welfare but developing and undeveloped countries faces significant issues comparatively large as lack of food supply, air and water, illiteracy, poverty, high mortality rate, unemployment and deforestation with this growth. Economists had a long-lasting debate over the impact of population growth on the economic development of a country. One state's that population growth helps a nation's economy by stimulating economic growth and development and another presents (Robert Malthus) that rapid increase in population is harmful to a nation's economy due to a variety of problems comes with this increase. Because over population places a tremendous amount of pressure on the resources which results in issues. The third one reveals that the growth in population doesn't have any impact on economic growth. The aim of this paper is to unearth the relationship between the population growth and economic development of a nation, understand the basic problems faced by a nation due to population explosion and offer suggestions.

**Keywords:** population growth, gross domestic product, per capita income and economic development

### Introduction

As per Population Reference Bureau's 2017, World Population Data Sheet, Earth will be home to 9.8 billion people by 2050. This indicates towards an increase of 31 percent in just 33 years which raises existing concerns of overpopulation <sup>[1]</sup>. World Economic Forum report also shows that the world is using natural resources 1.7 times faster than usual. Problem of population growth is a big hindrance in the success of economic planning and development <sup>[2]</sup>. Population is increasing at an alarming rate especially in the developing and undeveloped countries which results in a wretched condition of people who are deprived of the basic necessities of life and their standard of living is the lowest one <sup>[3]</sup>. Population growth and its effects had a center position of long lasting debate of economists. Some asserted that population growth impact negatively the economic growth and development of a nation but some other economists argued with positive consequences of population growth.

Population is also considered human capital an important factor of economic growth and development, as well as one of the sources of competitive advantages. In order to attain highly skilled human capital, countries should improve their labor skills, knowledge and techniques by investing more in education, science and technology <sup>[4]</sup>.

The present study is around the 11 countries such as China, India, United States, Indonesia, Pakistan, Brazil, Nigeria, Bangladesh, Russia, Mexico and Japan.

### Gross Domestic Product

Gross Domestic Product (GDP) is considered as most important indicator to represent the position of economy. It is a measure of total value of goods and services within the geographical boundaries of a nation. It indicates the speed how the nation growing fast. When the economy is expanding, the GDP growth rate is positive which impact positively also businesses, jobs and personal income <sup>[5]</sup>. Growth brings many good things such as employment, income of source, literacy and good standard of living. Population growth has a relationship with the GDP growth. Labour is considered as a main factor of production when population increases labour force also enlarge and the output may enhance <sup>[6]</sup>. More people produce more output which in all turns in prosperity and welfare.

### Per Capita Income

Per capita income is also considered as average income of a country during a specified period. It a measure used to identify the economical and social status of a nation's economy. It is calculated by dividing country's total income by total population. It can also be said that it is a average contribution of country's person in GDP. Population growth could be beneficial or detrimental to per capita income depending on whether a country is developed or still developing. Developing countries can expect to make gains in income considerably by limiting population growth but developed countries follow policy actions to increase population growth rates in order to increase income <sup>[7]</sup>.

<sup>1</sup> <https://www.weforum.org/agenda/2017/08/the-earths-population-is-going-to-reach-9-8-billion-by-2050>

<sup>2</sup> <http://www.economicdiscussion.net/articles/main-effects-of-population-explosion-in-india/2254>

<sup>3</sup> <http://www.yourarticlelibrary.com/population/4-major-effects-of-population-explosion-education/84403>

<sup>4</sup> <https://hrcak.srce.hr/file/93385>

<sup>5</sup> <https://www.thebalance.com/what-is-the-gdp-growth-rate-3306016>

<sup>6</sup> <https://socratic.org/questions/what-is-the-effect-of-population-growth-on-gdp>

<sup>7</sup> <https://iaes.confex.com/iaes/Boston68/techprogram/P3486.HTM>

## Economic Development

It is regarded as growth of the standard of living of a nation's people moving from a low-income (poor) economy to a high-income (rich) economy or a process of getting more wealthier, happier and prosperous. When the quality of life is improved, there are more chances of economic development<sup>[8]</sup>. There are many ways to measure the economic development of a country such as GDP rate, per capita income, capital formation rate, employment level and industrial growth. Population growth impacts the economic development of a country. An increase in population is necessary for increase in wealth and development. But, on the other hand Malthus who regards population growth as the number one barrier to economic development<sup>[9]</sup>. The present paper is an effort to identify the relationship between the population growth and economic development.

## Review of Literature

Bhanu Phani Krishna Koduru and Archana Tatavarthi (2016)<sup>[10]</sup> analyzed the impact of population growth on economic development of India by using regression technique. They highlighted the effects of rapid increase in population on the economic growth and development of India. He studied the interaction of population growth and economic development. They concluded that population growth had a positive impact on the economic development in India and for every unit increase in population, the GDP grows by 3.383108 units which shows that population growth has a positive impact on the economic development of India.

Gideon Kiguru, Gachanja Paul and Obere Almadi (2013)<sup>[11]</sup> presented three different theories related to the relationship between population growth and economic growth. The study is based on the Kenya country. The study is based on the Vector Auto Regression estimation technique and used annual time series data. The period of study is the 1963 to 2009. The findings and results showed that existence of a long-run relationship between population and economic growth in Kenya and provide strong support for the hypothesis that population is driving economic growth in the country and it also supports to the population-driven economic growth. The study concludes that in Kenya population growth increases economic growth and consequently economic development.

Shubhi Agrawal (2014)<sup>[12]</sup> stressed on the role of population in generating labour force. Labour is treated as most active factor of production. There are many resources which help in production. So other resources are also required in sufficient quantity to produce. He highlighted the effect of population on the economic development of a

nation. They found that the fast increasing population makes the task of employing the labor force in productive activities and it was also examined that it increases the demand for resources. They concluded that there is a need to establish correlation between the population growth and economic development by only ensuring the supply of resources proportionate to it.

Manjul Mayank Pandey, Dr Rupam Tiwari and Dr Anupama Choubey (2015)<sup>[13]</sup> analyzed the short term and long term changes due to population growth. He asserted the four main components of population change. He stressed on optimum utilization of working ages population as per their age structure for skilled development and economic growth of India.

## Research Methodology

The study is descriptive in nature. The random sampling technique was used in selecting of countries. The F-test, Coefficient of variance and correlation were used to test hypotheses. The period of study is 11 years from 2008-09 to 2016-17.

## Objective of study

1. The main purpose of study is to understand the relationship between population and GDP Growth Rate.
2. To show the impact of per capita income on gross fixed capital formation.
3. To offer suggestion on the basis of findings.

## Hypothesis

Following hypotheses were framed to arrive at significant conclusions such as-

1.  $H_0(1)$ : There is no significant variation in year wise population growth of X and Y countries.
2.  $H_0(2)$ : There is no significant relation between population and GDP Growth rate.
3.  $H_0(3)$ : There is no significant association in per capita income and gross fixed capital formation of various countries.
4.  $H_0(4)$ : There is no significant dissimilarity in death rate and unemployment rate of various countries.
5.  $H_0(5)$ : There is no significant consistency in death and poverty rate of various countries.

## Limitation of Study

The study has following limitations-

1. The study is limited to only 11 countries.
2. It is confined to only economic development and growth.
3. The study doesn't deal with the environmental issues.

<sup>8</sup> [https://simple.wikipedia.org/wiki/Economic\\_development](https://simple.wikipedia.org/wiki/Economic_development)

<sup>9</sup> <http://www.economicdiscussion.net/economic-development/population-growth-and-economic-development-a-close-view/11808>

<sup>10</sup> Bhanu Phani Krishna Koduru and Archana Tatavarthi, "Effect of Population Growth on Economic Development in India", Research Gate, March 2016.

<sup>11</sup> Gideon Kiguru, Gachanja Paul and Obere Almadi, "The Impact of Population Change on Economic Growth in Kenya", International Journal of Economics and Management Sciences, Vol. 2, No. 6, 2013, pp. 43-60.

<sup>12</sup> Shubhi Agrawal, "Impact of India's Population Growth on Economic Development" Indian Journal of Research, Volume: 3, Issue: 5, May 2014 ISSN - 2250-1991.

<sup>13</sup> Manjul Mayank Pandey, Dr Rupam Tiwari and Dr Anupama Choubey, "Population Dynamics in India", International Journal of Scientific & Engineering Research, Volume 6, Issue 1, January-2015, ISSN 2229-5518.

**Testing of Hypothesis**

*H<sub>0</sub>(1): There is no significant variation in year wise population growth of X and Y countries.*

**Table 1:** Population of Various Countries

Year	X Countries' Population (in crore)					Average	Y Countries' Population (in crore)						Average
	China	India	United States	Indonesia			Pakistan	Brazil	Nigeria	Bangladesh	Russia	Japan	
2009	133.14	116.64	30.68	23.93	76.0975	16.1	19.32	15.44	15.04	14.19	12.76	11.55	26.1
2010	133.97	118.21	30.93	24.25	76.84	17.05	19.49	15.85	15.21	14.28	12.75	11.73	26.59
2011	134.41	121.01	31.16	24.57	77.7875	17.41	19.86	16.28	15.39	14.3	12.78	11.9	26.98
2012	135.07	123.25	31.4	24.88	78.65	17.79	20.05	16.72	15.57	14.35	12.76	12.08	27.33
2013	135.74	124.98	31.62	25.2	79.385	18.17	20.24	17.18	15.75	14.35	12.74	12.25	27.67
2014	136.43	126.62	31.86	25.51	80.105	18.55	20.42	17.64	15.94	14.38	12.73	12.42	28.02
2015	137.12	128.29	32.1	25.81	80.83	18.94	20.59	18.11	16.12	14.41	12.71	12.58	28.365
2016	137.87	129.98	32.34	26.11	81.575	19.32	20.76	18.59	16.29	14.43	12.7	12.75	28.71
2017	138.64	131.69	32.57	26.39	82.3225	19.7	20.92	19.08	16.46	14.45	12.68	12.91	29.05

Source: WWW.CEICDATA.COM

Hypothesis 1 is based on the variation in population growth of various X and Y countries. For this some countries like China, India, Pakistan and Indonesia are treated as X countries and the countries like Pakistan, Brazil, Nigeria, Russia, Japan and Mexico are considered as Y countries.

**Table 2:** F-Test Two-Sample for Variances

	X Countries	Y Countries
Mean	79.28805556	27.64611111
Variance	4.540469965	0.976173611
Observations	9	9
df	8	8
F	4.651293493	
P(F<=f) one-tail	0.021781949	
F Critical one-tail	3.438101233	

For testing the above hypothesis F-Test two samples for variances was used to check the difference between their variances. The result shows that the Variance for X countries was greater than Y countries. The f (calculated value) is 4.651293493 which is greater than the f (critical value) which is 3.438101233. Hence it can be concluded there is significant variation in year wise population growth of X and Y countries.

*H<sub>0</sub>(2): There is no significant relation between population and GDP Growth rate.*

**Table 3:** Population and GDP Growth Rate

Country	Population	GDP Growth Rate
China	122.239	7.3
India	112.067	6.69
United States	28.466	1.51
Indonesia	22.665	4.89
Pakistan	16.303	3.89
Brazil	18.165	1.08
Nigeria	15.489	3.94
Bangladesh	14.177	5.81
Russia	12.914	0.67
Mexico	11.017	2.01
Japan	11.461	0.68

The above analysis shows the value of correlation (r) is +0.710207818 that means there is a significant moderate positive linear relationship between population and GDP rate. It can also be concluded from the study that population impacts the growth rate in a positive way. The data refers to the various 11 countries which are top most populated

countries. In above calculation average data was used to arrive at significant result. The pie chart below represents separately the average population and GDP growth rate of various countries.

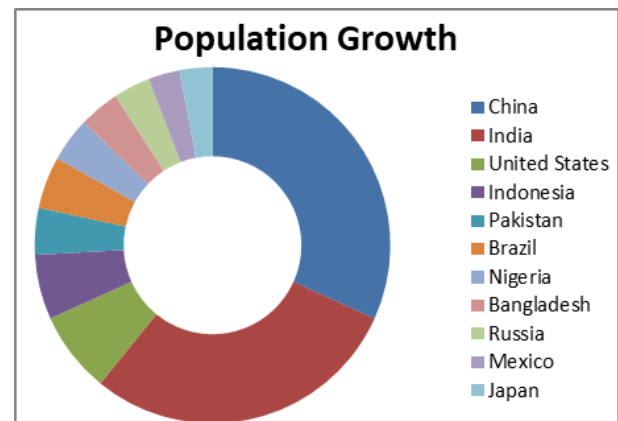


Fig 1

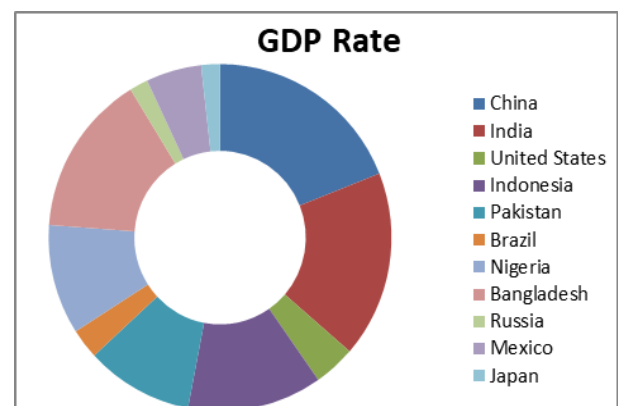


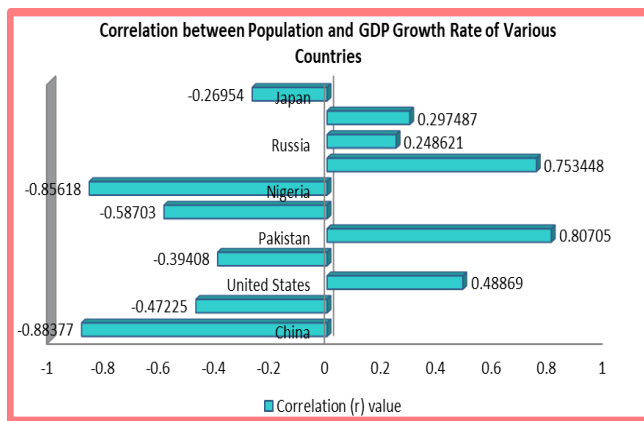
Fig 2

The below table shows the relationship of population and GDP Growth rate country wise. It is essential to calculate this because every country is different in terms of natural resources, climate, geographical location, economical and political environment. So the population may impact every country in a different way or in a same way. It is seen from the below table that every country has a different relationship between population and GDP growth rate such as China and India as highly populated countries have a negative relationship of population and growth rate. But United States has a positive relationship as like Pakistan,

Bangladesh, Russia and Mexico. Indonesia, Brazil, Nigeria and Japan are showing a negative relationship between population and GDP growth rate as shown in below Table and Figure.

**Table 4:** Relationship between Population and GDP Growth Country Wise

S. No.	Name of Country	Correlation (r) value
1.	China	-0.88377
2.	India	-0.47225
3.	United States	+0.48869
4.	Indonesia	-0.39408
5.	Pakistan	+0.80705
6.	Brazil	-0.58703
7.	Nigeria	-0.85618
8.	Bangladesh	+0.753448
9.	Russia	+0.248621
10.	Mexico	+0.297487
11.	Japan	-0.26954



**Fig 3:** Relationship between Population and GDP Growth Country Wise

*H<sub>0</sub> (3): There is no significant association in per capita income and gross fixed capital formation of various countries.*

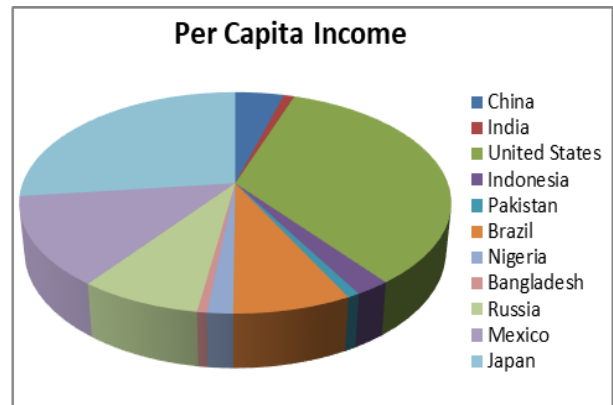
**Table 5:** Per Capita Income and Gross Fixed Capital Formation

S. No.	Name of Country	Per Capita Income (USD)	Gross Fixed Capital Formation (Trillion USD)
1.	China	6679.755	4.018
2.	India	1459.979	0.602667
3.	United States	53013.889	3.234444
4.	Indonesia	3456.772	0.348
5.	Pakistan	1209.070	0.032111
6.	Brazil	11607.503	0.417333
7.	Nigeria	2506.414	0.066111
8.	Bangladesh	951.889	1.220111
9.	Russia	11987.071	0.252889
10.	Mexico	20076.273	0.046222
11.	Japan	41514.388	0.371667

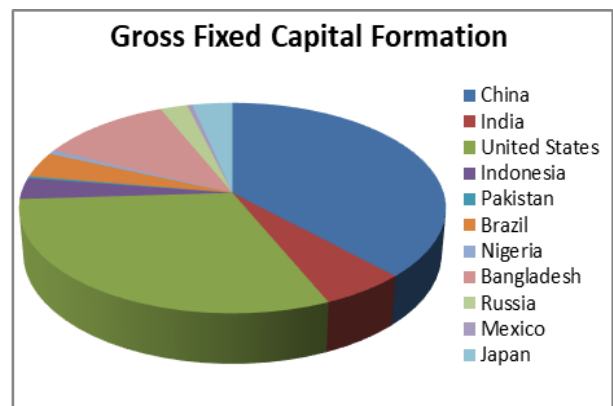
**Source:** <https://data.worldbank.org/indicator/NE.GDI.FTOT.CD?contextual=region&end=2017&loc>  
[www.indexmundi.com](http://www.indexmundi.com)  
[www.kneom.com](http://www.kneom.com)

Correlation of coefficient was used to test this hypothesis. The above analysis shows the value of correlation (r) is +0.3188931 that means there is a significant low positive linear relationship between per capita income and gross

fixed capital formation. It can be concluded that the per capita income of countries doesn't impact so much to the gross fixed capital formation. It may be supposed that countries may have the varied resources to form investment and a good environment for healthy investment policies and framework. So that the countries have less per capita income but more gross fixed capital formation. The pie-chart below shows the per capita income and gross fixed capital formation. It is seen that US has highest per capita income but not highest gross fixed capital formation and China has highest gross fixed capital formation but not highest per capita income.



**Fig 4**



**Fig 5**

*H<sub>0</sub> (4): There is no significant dissimilarity in mortality rate and unemployment rate of various countries.*

**Table 6:** Mortality Rate and Unemployment Rate

S. No.	Name of Country	Mortality Rate (in %)	Unemployment Rate (in %)
1.	China	7.222	4.078
2.	India	7.222	3.537
3.	United States	8.267	7.122
4.	Indonesia	6.289	4.727
5.	Pakistan	6.711	2.776
6.	Brazil	6.4	8.617
7.	Nigeria	14.044	4.681
8.	Bangladesh	5.444	4.217
9.	Russia	14.644	6.078
10.	Mexico	5.089	4.692
11.	Japan	9.533	3.994

**Source:** [www.indexmundi.com](http://www.indexmundi.com)  
[www.kneom.com](http://www.kneom.com)  
[www.statista.com](http://www.statista.com)

**Table 7:** F-Test Two-Sample for Variances

	Mortality Rate	Unemployment Rate
Mean	8.260454545	4.956272727
Variance	10.57145147	2.855953218
Observations	11	11
df	10	10
F	3.701549243	
P(F<=f) one-tail	0.025338898	
F Critical one-tail	2.978237016	

The mortality rate and unemployment rate were considered as parameters to judge the impact of population. For testing the above hypothesis F-Test two samples for variances was used to check the similarity between their variances. The result shows that the variance for mortality rate was greater than the variance for unemployment rate. The f (calculated value) is 3.701549243 which is greater than the f (critical value) which is 2.978237016. Hence it can be concluded there is significant dissimilarity in mortality rate and unemployment rate of various countries.

***H<sub>0</sub> (5): There is no significant consistency in mortality and poverty rate of various countries.***

**Table 8:** Mortality Rate and Poverty Rate

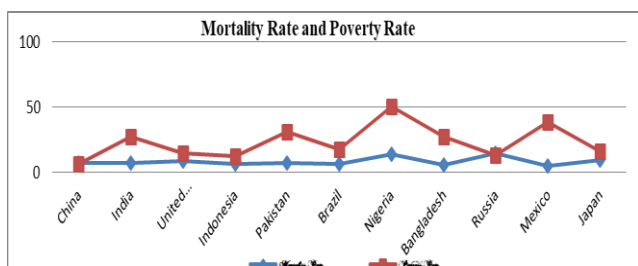
Name of Country	Mortality Rate (in %)	Poverty Rate (in %)
China	7.222	6.6
India	7.222	27.022
United States	8.267	14.167
Indonesia	6.289	11.933
Pakistan	6.711	30.689
Brazil	6.4	17.633
Nigeria	14.044	50.667
Bangladesh	5.444	27.522
Russia	14.644	12.789
Mexico	5.089	38.833
Japan	9.533	15.922

Source: [www.indexmundi.com](http://www.indexmundi.com)  
[www.kneom.com](http://www.kneom.com)  
[www.statista.com](http://www.statista.com)

**Table 9**

Variables	Mean	Standard Deviation (SD)	Coefficient of Variation (COV)
Death Rate	8.260455	3.251376858	39.3607477
Poverty Rate	23.07064	13.28331756	57.5767189

The above hypothesis was tested through the coefficient of variation (COV) with the help of standard deviation. The coefficient of variation for mortality rate was 39.3607477 and for poverty rate was 57.5767189. It is seen that there is more consistency in mortality rate and more variations are in poverty rate.



**Fig 6:** Mortality Rate and Poverty Rate

The above Figure shows the trend of mortality rate and poverty rate. The trend of poverty rate has more fluctuation but the mortality rate trend depicts that there are less variation in the mortality line of various countries or it can be said that there are more consistency in mortality rate as compared to poverty rate.

**Findings and Results**

It was found that the Variance for X countries was greater than Y countries which shows that there is significant variation in year wise population growth of X and Y countries. It can also be concluded from the study that population impacts the growth rate in a positive way. That means population rise results in high growth rate of a country. But it varies at each country level because every country is different in terms of natural resources, climate, geographical location, economical and political environment. So the population may impact every country in a different way or in a same way.

It was seen that every country has a different relationship between population and GDP growth rate such as China and India as highly populated countries have a negative relationship of population and growth rate. But United States has a positive relationship as like Pakistan, Bangladesh, Russia and Mexico. Indonesia, Brazil, Nigeria and Japan are showing a negative relationship between population and GDP growth rate. It was suggested to make hard efforts to increase the resources to meet the increased demands of high population.

The results also indicates that the per capita income of countries doesn't impact so much to the gross fixed capital formation. It may be supposed that countries may have the varied resources to form investment and a good environment for healthy investment policies and framework. So that the countries have less per capita income but more gross fixed capital formation. It is seen that US has highest per capita income but not highest gross fixed capital formation and China has highest gross fixed capital formation but not highest per capita income. The other countries are required to come with attractive and implementable investment policies so that countries can make more investment even with less per capita income.

The result also shows that there is significant dissimilarity in mortality rate and unemployment rate of various countries. It can be said that the variance for mortality rate is 10.57145147 and of unemployment rate is 2.855953218. So there are many other causes of mortality rate. The unemployment rate may not only be considered for increasing mortality rate.

The poverty rate has more fluctuation but the mortality rate trend depicts that there are less variation or more consistency in the mortality rate of various countries. The coefficient of variation for mortality rate was 39.3607477 and for poverty rate was 57.5767189. It is seen that there is more consistency in mortality rate and more variations are in poverty rate.

**Conclusion and Recommendation**

Population is rising at a high speed. The growth of population demands larger for the resources but developing and undeveloped countries are facing bad effects of population explosion in lack of resources. The finding of study shows the positive relationship between population and GDP growth as the study goes to each country wise

relationship it provide negative relationship between the fact that population is driving economic growth. It was suggested to make such strategy and framework which can help to increase the resources of a country. There is also need of the role of government to frame policies to create a good and healthy environment of investment. It can be concluded with the remark that the developed countries utilize their resources in a better way as compared to developing and undeveloped countries hence it can be said that population growth is a progress for the countries having good resources and sound policies.

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