CHAPTER II

DISTRIBUTION AND GROWTH OF POPULATION
Importance of a clear idea of the number of people inhabiting a region, the density of population in different segments and the region’s capacity to provide for those living on it can hardly be gainsaid in a study of pressure of population on agriculture. On one hand it brings into sharp focus the existing situation, on the other it helps formulate plans for the future.

**METHODOLOGY**

The demographic data used in this study have been obtained from the Census of India publications, in particular from the *Census Handbooks* of 1961 and 1971 for the districts of Sagar and Damoh. Patwari circle-wise data for population have been obtained by adding up the population of the villages falling under a patwari circle. Data for 1981 have been taken from the provisional census figures published for Madhya Pradesh.

Different types of densities have been arrived at by correlating the population figures reported in the *Census Handbooks* of 1971 with the figures of arable land and net sown area available from the unpublished patwari circle-wise data of land use. Since a patwari circle is a small unit, the densities relating to it are expected to convey the objective picture of pressure of population on land. The four types of densities have been calculated by the following formulae.

<table>
<thead>
<tr>
<th>Arithmetical Density</th>
<th>Total population</th>
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<tbody>
<tr>
<td></td>
<td>Total Area</td>
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<table>
<thead>
<tr>
<th>Physiological Density</th>
<th>Total Population</th>
</tr>
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<td></td>
<td>Cultivable land</td>
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</table>
Agricultural Density
Nutritional Density

Agricultural Population
Total Population

Net Sown Area
Net Sown Area

The total area of patwari circles, for calculating the arithmetic density of population, has been obtained by adding up the areas of the villages falling under a particular circle obtainable from the Census Handbook, 1971. The areas of uninhabited villages have not been excluded while computing the arithmetic density because they do not essentially constitute empty spaces of the region and often serve to share the pressure of population on land.\(^2\)

For visual impression and the location of inhabitants with relative density of rural population, the dot method has been used for mapping. The population of different urban centres has been depicted with the help of proportionate circles. The patwari circles have been represented by dots while uninhabited areas have been left blank. It was considered inadvisable to represent every village by a dot since boundaries of numerous small villages are not delineable on the base map, making the task of placing dots extremely difficult.

1. Since data for actual population involved in agriculture are not available, only cultivators and agricultural labourers have been included in agricultural population.  
2. It is difficult to distinguish between the real uninhabited areas — the non-agrarian — and those under human occupation indirectly.
General pattern of population growth has been visualized for the region as a whole since figures are available only for tahsils, from 1901 to 1961. Patwari circle-wise growth-rate has been arrived at by comparing the 1961 and 1971 figures. Data on sex-ratio and age-composition were also not available patwari circle-wise. Region-wise sex-composition has been compiled with the help of census reports while patwari circle-wise figures have been computed on the basis of 1971 Census Handbooks, 1971. Data for age-composition are available only district-wise. Although all the tahsils of the Sagar district do not belong to the Sagar-Damoh plateau, trends of age-composition of the region could be gathered by paying attention to the figures for the whole of Sagar district. The age-composition of the Sagar-Damoh plateau has been computed only on the basis of the 1971 census.

migration data for this region are not available.

The growth map has been used to develop a rough idea in this regard. The rate of natural increase in India as a whole has been assumed to be operative in this region also. The growth in this region has been divided into three parts on this basis. As the rate of natural increase is 24 per cent, from 22 to 26 per cent has been considered normal increase after giving margin on both the sides. Where population has grown at a rate higher than 26 per cent, the area has been assumed to be a land of opportunity attracting in-migration while the reverse would be the case for areas where the rate of population-growth has been less than 22 per cent.
All the maps showing the areal pattern of this region are coropleth maps. In order to determine the categories, frequency-graphs have been plotted first, followed by the computation of median values. Finally, categories have been formed by keeping equal distance from the median.

DENSITY OF POPULATION

By and large, the survival needs appear to exercise a decisive influence on the density of population of any region. As Trevartha has observed, "Man and land are the ultimate elements in the life of human society so that number of people in proportion to the amount of land is a fundamental consideration in population study". In a predominantly agricultural economy, density of population would really signify the capacity of resources to sustain a certain number of people at the existing level of technological development. As and when the number grows beyond a certain limit, loosely described as the population optimum, the search for a new equilibrium becomes imperative. This can be, and has usually been, done in two ways. Outmigration of excess population can partly solve the problem but the need for intensification of farming through better and larger amounts of inputs like irrigation, fertilisers, mechanisation wherever feasible, etc.

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will still remain. Understanding of population density, in this way, becomes rather important in all planning effort. In order to achieve a medium of exactitude in this regard, four types of densities — arithmetic, physiological, agricultural and nutritional — have been computed for this region in the following pages.

Arithmetic Density:

Arithmetic density of this region is 114 persons per square kilometre, which is somewhat lower than the State's average of 118. However, owing to the rather uneven distribution of population in this region, this figure tends to paint a simplistic picture. There is need to guard against being misled. Depending on the topography and composition of soil, which differs from place to place even within this small region, arithmetic density also varies from place to place.

The region can be divided into four categories from the point of view of arithmetic density, as Map 10 shows:

1. Patwari circles of very high arithmetic density— over 150 persons per square kilometre;

2. Patwari circles of high arithmetic density— between 100 and 150 persons per square kilometre;

3. Patwari circles of moderate arithmetic density— between 50 and 100 persons per square kilometre;
4. Patwari circles of low arithmetic density—

less than 50 persons per square kilometre.

1. Patwari Circles of Very High Arithmetic Density:

Nearly 9 per cent of the patwari circles of this region have an arithmetic density of more than 150 persons per square kilometre. Found in small patches, these circles are either in or around big villages and townships or where the land is very fertile. In the Western highlands, uplands of the Beas and the Sonar and the areas near the Kopra have these circles in plenty. Some circles are found in the southern tip of the Northern highlands. In the Southern highlands such circles are along the course of the Beas and in the upper waters of the Guraiya nala.

2. Patwari Circles of High Arithmetic Density:

High arithmetic density characterises some 37 per cent of the patwari circles. Long stretches in the Beas upland, small patches in the uplands of Dhasan and Sonar and in the Kopra valley, some patches along the course of Dhasan, Beas and Guraiya nala and certain segments of the Singrampur valley belong to this category.

3. Patwari Circles of Moderate Arithmetic Density:

This category has the largest number of circles, 46 per cent of the total. These are mostly situated in the Western highlands, especially the Dhasan upland and the upper waters of the Beas, the Sonar and the Bannar. Patches can be seen
in the Sonar upland and at several places in the Southern highlands also.

4. Patwari Circles of Low Arithmetic Density:

The remaining 8 per cent of this region's patwari circles have an arithmetic density of less than 50 persons per square kilometre. These belong to the Baran hills region of the Northern highlands, hills near the Sina river and the eastern tip of the Western highlands, the hilly and forested areas of the Mangarh range and, lastly, areas to the north of the Banerar and Kaimur ranges.

Physiological Density:

This kind of density really indicates pressure of population on agriculture inasmuch as it is computed by relating not the entire area to the number of persons living in it, as was done in the case of arithmetic density but only the arable land. Average physiological density in this region is 149 persons per square kilometre. However, the range of variation is greater in this case, from 11 to 724 persons per square kilometre. Such a wide variation perhaps indicates that many areas are underpopulated. It may also be due to mobility in the vicinity of urban areas. The minimum figure in most cases is the result of the fact that while families get sent back to live and work in the towns, the cultivators stay on in the villages. On the other hand, in several cases the towns have spilled over in the adjoining or nearby villages, though the latter continue to be treated as parts of patwari circles.
These areas show a highly inflated physiological density.

As Map 11 shows, the region can be categorised into these three segments from the point of view of physiological density:

1. Areas of high physiological density — over 200 persons per square kilometre;

2. Areas of moderate physiological density — between 100 and 200 persons per square kilometre;

3. Areas of low physiological density — less than 100 persons per square kilometre.

1. Areas of High Physiological Density:

The highest physiological density is found associated with the areas where percentage of arable land is less than 55. These are mainly the hilly, forested tracts of the Northern highlands and those between the water-sheds of the Dhasan, the Bexas, the Sonar and the Kopra in the Western highlands. In the Southern highlands, most areas of this type are located around the upper waters of the rivers.

2. Areas of Moderate Physiological Density:

Moderate physiological density — between 100 and 200 persons per square kilometre — is found in areas where the percentage of arable land varies between 55 and 85. These areas are found all over the Northern highlands. In the Western highlands, these areas are situated in the uplands of Dhasan, Sonar and Kopra. In the Southern highlands this category is
found in the upper waters of the Barama as well as near the Hiran river and in the Singraupur valley. Areas around the Padri nala in the eastern part of the Southern highlands and its eastern most part above the Kaimur range also belong to this category.

3. Areas of Low Physiological Density:

The lowest physiological density is found in areas where arable land is over 65 per cent of the total area. There are very few patches of this type, limited mostly to the upper waters of the Barama, the Dhasan and the Sonar. The Sonar upland and the Northern highlands also have a few patches. In the Southern highlands it is confined to the upper waters of Guraiya nala and Padri nala.

Agricultural Density:

This type of density connotes the demands that the agricultural workers or rather that section of population which depends on agriculture for its livelihood make on the agricultural resources. As the Map 12 clearly indicates, agricultural density suffers from spatial variations to a much lesser extent than other types of density.1

1. The 1971 Census Report does not list the non-workers dependent on agriculture separately. Consequently, it has not been possible to compute agricultural density in its full sense in the present study, confined as it is to only agricultural workers.
Average agricultural density obtaining in this region is 53 persons per square kilometre. Three types of areas are discernible from this viewpoint. Those with high density, i.e., above 60 persons per square kilometre, those with moderate density with between 20 and 60 persons per square kilometre and those with low density, i.e., fewer than 20 persons per square kilometre.

High agricultural density appears to be in direct proportion with high physiological density. It is especially notable in the patani circles where the net sown area under rice cultivation is over 60 per cent, probably due to a greater requirement of labour in rice cultivation. Patches in the Northern highlands, particularly those along the Bila river belong to this category, as do the Bawas and Sonar uplands of the Western highlands and the river valleys of the Southern highlands.

Segments of moderate agricultural density can be seen all over the Western highlands and the uplands of Dhasan, Bawas and Sonar. The upper waters of the Banar and Kopra as well as those of the Beams in the Southern highlands also belong to this category.

The low density areas are found mostly in the villages near urban centres. Only small and marginal farmers and agricultural labourers live in these villages while the big farmers and the families of the labourers live in the towns.
Nutritional Density:

The last type of density depicts the relationship between the population of a region and the net sown area belonging to it. In this context, it may be noted that the bulk of the net sown area in the region under study raises only food crops, thus directly contributing to nutrition. Overall nutritional density of this region is 180 persons per square kilometre.

As the Map 13 shows, this region has four distinct types of patwari circles from the present point of view:

1. Areas of high nutritional density — more than 300 persons per square kilometre;
2. Areas of moderately high nutritional density — between 300 and 200 persons per square kilometre;
3. Area of moderate nutritional density — between 200 and 100 persons per square kilometre;
4. Areas of low nutritional density — less than 100 persons per square kilometre.

1. Areas of High Nutritional Density:

Areas where conditions are not propitious for agriculture but which nonetheless have sizable populations belong to this category. Net sown area in the Northern and the Southern highlands is conspicuously small since both these regions are really hilly tracts covered with forests. Water is scarce for irrigation, soil is infertile and there considerable erosion too. Angle of slope is high. Both these regions
SAGAR - DAMOH PLATEAU

NUTRITIONAL DENSITY
OF RURAL POPULATION
1971

MAP 13

PERSONS PER KM²
OF NET SOWN AREA
> 300
250
200
150
< 100

URBAN AREA

FOREST AREA

KMS 10 5 0 10 KMS

SOURCE: DISTRICT CENSUS HANDBOOKS 1971, TAHSAIL LAND RECORDS
have a nutritional density of over 300 persons per square kilometre, which only demonstrates their relative poverty and backwardness. Few patches in the otherwise better-off Western highlands also belong to this category. However, these are either near townships and accommodate the latter's spill-over or are covered with forests.

2. Areas of Moderately High Nutritional Density:

Nutritional density of between 300 and 200 persons per square kilometre is found near the Hila river in the Northern highlands. In the Western highlands it is found in the Beas upland and in the Kopra valley. In the Southern highlands the entire area of the Beas valley except its upper waters, the Hiran valley, the Sun valley, except the Mangarh range, areas along the Suraiya nala and Padri nala and, finally, the patwari circles covering the forested areas belong to this category.

3. Areas of Moderate Nutritional Density:

The Western highlands have the bulk of patwari circles belonging to this category. These are stretched all over the uplands of Dhasan and Beas and the upper waters of Sonar and Baner. The Sonar upland is almost wholly covered with these circles. While only a few patches of this category are found in the Southern highlands, the Northern highlands' share is confined only to its southern tip and the areas where the Dhasan forms its western boundary. The upper waters of Beas, areas adjoining the Sonar upland and the eastern sector where the Padri nala flows from north to south are the segments in the Southern highlands belonging to this category.
4. Areas of Low Nutritional Density

It is interesting to note that areas marked by a very low percentage of not sown area accompanied by an equally low physiological density are also there in the region under study. These belong to the last category of fewer than 100 persons per square kilometre. Circles of this type are situated mostly in the upper waters of the Bannar. Some patches are found in the Sonar upland also.

DISTRIBUTION OF POPULATION

Speaking broadly, the term 'population' denotes the total number of persons in a given area at a given time. Any kind of population study must take into account the space and time factors if it has to faithfully bring out the geographical personality of a given region.

Several geographical variables actively govern the distribution of a region's population. Not only physical factors like relief pattern, soils, climate conditions and water supply but also numerous historical, social, economic, political and demographic factors appear to pre-determine it. As Clarke has observed, "Population distribution is ever-changing and cause and effect vary in time and space."

The pattern of population distribution in the region under study, as Map 14, is determined chiefly by topography, soil conditions and water supply. Added to these is the fact that

subsistence agriculture appears to characterise this region. Consequently, pattern of distribution of population is largely a function of the factors determining the initial productivity of the land and its ability to support population.

The total population of the Sagar-Damoh plateau according to the census of 1981 is 2,043,025 while that of the state of Madhya Pradesh is 52,140,000(3). Thus 3.92 per cent of the State’s population inhabits some 3.46 per cent of the State’s area in this region. The Sagar Damoh plateau is among the less densely populated regions of the State with a population density of 114 per square kilometre as against the state’s average of 118 per square kilometre.

The region is predominantly rural. 76.86 per cent of the region’s total population or 1570459 persons, lived in villages in 1981. However, proportionately, it was 2.83 per cent less rural than the State as whole. Total number of villages in this region is 2929 (2.35 per cent of the state’s total). Percentage of uninhabited villages in this region, however, is higher than the State’s average. While 92.92 per cent villages were inhabited in the State, only 96.07 per cent villages of this region are inhabited. Of the 250 towns of Madhya Pradesh, only 12 are located in this region.


Map 14 reveals an uneven distribution of population in this region. Four types of areas are discernible:

1. The Densely populated areas;
2. The Moderately populated areas;
3. The Sparsely populated areas; and
4. The Uninhabited areas.

1. The Densely Populated Areas:

Clusters of densely populated areas are found in the river basins and along the railway tracks. These are situated in the uplands of the Beams, the Sonar, the Kopa and here and there in the Beama valley. Only a few patwari circles come under this category. These areas have the advantage of level terrain, fertile soil and a high sub-soil water table ensuring adequate supply of drinking water all the year round. Percentage of arable land in the total area is very high, as much as 97 per cent in certain segments. Other facilities like transport, hospitals, educational institutions and electricity are also within reach of these areas.

2. The Moderately Populated Areas:

Areas of moderate population concentration are widely spread. These are particularly to be found in the Sonar basin, the Western highlands and the Beama basin. Almost the whole of Dhasan basin comes under this category. Segments in the Beams upland, the Kopa basin, the upper waters of Beamer, the upper waters of Beama, Guraiya nala and Hiran river also belong to this class. Proportion of arable land in these areas
is relatively smaller than in the preceding category. The areas under the moderately populated category in fact represent the transitional zone between the densely populated and the sparsely populated areas. These areas are found mostly on the gentle slopes.

3. The Sparsely Populated Areas:

The third type of areas are found mainly on the Northern highlands and in the stretches of the Southern highlands. Patwari circles of the Western highlands, which are more hilly in character and having large proportion of forested area, also come under this category. Situated on the sharper slopes, the land in the hilly terrain of these areas hardly offers hospitable conditions for human settlement. The land is undulating, dissected and rocky. The soils are thin with rather limited capacity for retaining moisture. Such soils cannot be fertile. The percentage of arable land is less than 55. Net sown area does not form even 60 per cent of the arable land. These areas suffer from acute water shortage during summers. The rocky substratum does not permit utilisation of underground water. Water is obtained from some of the larger streams, man-made tanks or springs. Proximity of forests, wild animals, poisonous insects and crop-destroying birds further dissuades human settlement and agriculture. Remoteness from railway and/or metalled roads make these areas inaccessible. A greater part of these areas is 10 kilometres or more away from the railway or roads. Some of these areas in the Northern and Southern highlands are more than 20 kilometres away.
4. The Uninhabited Areas:

Uninhabited areas of this region are of two distinct types. As Map 15 shows, on one hand are the reserved and protected forests which are closed for human habitations. On the other are areas which belong to people to be used indirectly for mining or grazing and consequently are not open spaces. Some of these are even under cultivation. Regrettably the Indian census does not take these two types of uninhabited areas into account and does not provide full information about them. Out of a total of 2929, as many as 406 or 13.81 per cent villages are uninhabited. About 5 percent of these are in the Western highlands while the rest 8.81 per cent are in the Northern highlands, the Sonar upland and the Southern highlands.

GROWTH OF POPULATION

The rate at which a population grows has traditionally been regarded as an indicator of its economic buoyancy, material prosperity and social tranquility. However, there are several hypotheses regarding the factors which appear to determine or influence the growth of population. Following Coonts¹, Clarke has classified these into biological, economic and cultural, though he is not satisfied with any of them.²

¹ Cf. Coonts, S.E., Population Theories and Their Economic Interpretation, 1957 quoted by Clarke, John I., infra.
Biological theories try to correlate population growth with protein and vitamins hunger or postulate cycles of population growth unique to a particular cultural epoch. It is also held that increase in density lowers fertility. Cultural theories, in contrast, lay emphasis on man's character and culture as determinants of his fertility. These are based on the assumption that a rational mind would weigh advantages and disadvantages of parenthood vis-à-vis more materialistic desires. Economic theories, whether neo-classical or Marxist, hold that the demand for labour determines its supply. There are serious objections to all these viewpoints and a little reflection easily highlights exceptions. Clarke's disinclination to go whole-hog with any one of these is therefore understandable. It is, of course, common sense that industrial/technological development, reduction in mortality rate due to better medicare, availability of hygienic nutrients and water and checks on birth-rate through contraception have some role to play in the fluctuation of population. History of population growth in this region shows some of these factors at work. Poor and in some areas even non-existent medicare was responsible for a decline in population during the decade 1911-21. As medical facilities improved and more avenues become available for making a living, population curve shows an upward trend till vigorous family planning measures once again brought it down.
TABLE II:1

Population growth 1901-1981

<table>
<thead>
<tr>
<th>Decade</th>
<th>Sagar-Damoh Plateau</th>
<th>Madhya Pradesh</th>
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</thead>
<tbody>
<tr>
<td>1901-11</td>
<td>+15.935</td>
<td>+15.3</td>
</tr>
<tr>
<td>1911-21</td>
<td>-03.035</td>
<td>-01.4</td>
</tr>
<tr>
<td>1921-31</td>
<td>+04.775</td>
<td>+11.4</td>
</tr>
<tr>
<td>1931-41</td>
<td>+10.76</td>
<td>+12.3</td>
</tr>
<tr>
<td>1941-51</td>
<td>+05.35</td>
<td>+08.7</td>
</tr>
<tr>
<td>1951-61</td>
<td>+23.92</td>
<td>+24.2</td>
</tr>
<tr>
<td>1961-71</td>
<td>+32.07</td>
<td>+28.67</td>
</tr>
<tr>
<td>1971-81</td>
<td>+25.11</td>
<td>+25.17</td>
</tr>
</tbody>
</table>

Source: Census Handbooks for Sagar and Damoh Districts, 1961, 1971 and Provisional Figures of Population, 1981 Census, Supplementary Table 1, p. 50.

It is evident from the table that during the first eighty years of this century, population of the state increased by 101 per cent while that of this region by about 94 per cent, suggesting a relatively smaller gain from net migration.

Population increase over the first decade can be considered more or less normal. The second decade registered a decrease owing to the worst epidemic experienced so far in this country. Yet, it may be pointed out that, probably due to its general backwardness, this region suffered more than
the rest of the State. The next three decades were a period of slow growth, the low rate due to the difficult economic conditions of the great slump period and the Second World War. Population grew at a terrific pace in the post-Independence years, so much so that during the seventh decade this region had a higher rate of growth than the State. It is gratifying that the growth rate came down in the 1971-81 decade from 32.07 per cent to 25.11 per cent. The following formula has been used to measure population growth in individual circles.

\[
\left( \frac{P_2}{P_1} - 1 \right) \times 100
\]

Where \( P_1 \) denotes population at the end of the decade while \( P_2 \) denotes the population of the base year. It appears that the agriculture-based subsistence economy of this region attracts and discourages population according to favourable and unfavourable conditions of man-land relationships.

This region can be divided into five categories from the viewpoint of population growth (Map 16):

1. Areas of very high population growth (above 40 per cent);
2. Areas of high population growth (26 percent to 40 per cent);
3. Areas of natural increase (22 per cent to 26 per cent);
4. Areas of low population growth (00 per cent to 22 per cent) and
5. Areas of negative growth.
SAGAR- DAMOH PLATEAU
GROWTH OF RURAL POPULATION
1961-71

PERCENT CHANGE

0
14
22
26
32
40

KMS. 10 5 0 10 KMS.

URBAN AREA
FOREST AREA

BASED ON DISTRICT CENSUS HANDBOOKS 1961, 71.
1. The first category covers nearly 18 per cent patwari circles. Most of these are situated in the Sonar upland, Singrampur valley of the Southern Highlands and the Baniar river valley of the Western Highlands. Perhaps fertile river basins alone are responsible for encouraging population explosion in this region. Few patches can be seen in the Beas and Bina uplands also, while some others are in the Beas hill area of the Northern Highland. Patwari circles lying close to cities also show very high growth rate.

2. High population growth seems to be the dominant character of this region, found as it is in some 45 per cent of the patwari circles. Nature is kind to man in all these areas also. In the Western highlands, the areas near the Bina river, almost the whole of the Bina and Beas uplands and the upper waters of the Baniar and Kopra rivers belong to this category. Some patches are found in the Northern Highlands, especially where the Beas flows in a northerly direction. The Sonar upland and the areas near the Beas in the Southern Highlands also show high population growth, as do the Sun valley and the Guraiya nala. Patwari circles near the townships naturally belong to this category since the urban population tends to spill over into these areas. These circles are more advanced in agriculture and in providing facilities.

3. A mere 13 per cent of the total number of patwari circles appear to have what is termed as natural increase, i.e., from
22 per cent to 25 per cent. These are distributed all over the region, the Sonar upland being the only exception. Areas along the Bhutan in the Northern Highlands, watershed of the rivers in the Western Highlands and areas near the forested tracts and the Mangarh Range in the Southern Highlands belong to this category in particular.

4. Some 23 per cent patwari circles exhibit low population growth. These are, predictably, areas not particularly hospitable. These are confined to the foothills of the Northern Highlands, some pockets of the Western Highlands and the upper waters of the Beema in the Southern Highlands. Some patches are in the Mangarh range also.

5. Not more than 1 per cent of the patwari circles belong to the last category. Found near the townships of the Western Highlands, these are the areas inhabited only by working people who leave their families in the townships.

In conclusion, it may be noted that from the first to the fourth decade of this century, population increase has been markedly higher in the Sonar upland and the Southern Highlands. From the fifth decade onwards, however, the Western Highlands are showing higher growth-rate. In the seventh decade the Sonar upland and the Southern Highlands once again gained an ascendency. With a growth rate of 23 per cent and above they left the Western highlands behind which had a growth rate of 31 per cent.