

## RESEARCH REPORT

### VARIABLES OF POPULATION GROWTH

THIS REPORT DISCUSSES the variables of population growth in a tribal community in the Midlands of Rhodesia. A model of nutritional stress shows how these variables inter-relate to influence birth rate and child mortality in rural families. The overall analysis suggests that population control is effected in two ways: either through stress and poverty when the birth rate declines and child mortality increases, or through security and economic development when the birth rate and child mortality decline. The analysis also shows that the highest birth rate occurs in families where there is a subsistence level of nutrition.

We originally put forward these views in 1975<sup>1</sup> and Mr H. Dunlop in reviewing this, and other publications, criticized our findings as follows:

The major finding of Theisen's work, presented in the two pamphlets under review, is that there is a simple causal relationship between socio-economic status and family size; this is positively dangerous. The following is a reasonable summary of the present state of research on the topic:

In a recent work, Karen O. Mason and her associates reviewed and analyzed more than a hundred studies on differential fertility in the developed and developing countries. In this work, the authors present the major studies undertaken to measure the effect of socio-economic variables on family fertility. The major variables included in the studies were: income, occupation, social and geographic mobility, education, family structure, female labour-force participation, egalitarian maternal relationship, religion and religiosity, value orientation, and family planning. After a careful examination of the results of these studies, the authors have found very little evidence of uniformity and consistency in the findings of the studies... while modern value orientation and high socio-economic mobility reduce the high fertility, norms and practices amongst the urban Spirazi, these facts seem to have a positive effect on the fertility pattern of the tribal population.<sup>2</sup>

In saying this, Dunlop seems to have completely misunderstood the significance of the Rhodesian findings, for not only do they agree in general with

<sup>1</sup> R. J. Theisen, *The Exploding Population Problem in the Tribal Trust Lands of Rhodesia* (Salisbury, The Tribal Areas of Rhodesia Research Foundation, 1975).

<sup>2</sup> H. Dunlop, 'The Publications of the Tribal Areas of Rhodesia Research Foundation', *Zambezia* (1975-6), 4, ii, 112, quoting A. A. Paydarfar, 'Socio-cultural correlates of fertility among tribal, rural and urban populations in Iran', *Social Biology* (1975), 22, 151.

findings in other countries but they also help to explain these other findings. In particular there are two points I wish to make in connection with this criticism.

Firstly, the 'simple causal relationship between socio-economic status and family size' that he claims to find in my analysis is not in fact there. What I argued was that the relationship between family size and socio-economic status was a function of systems of stress and security. In other words, an increase of status does not necessarily lead to security, and it is security that is all important. For example, when socio-economic variables such as school education are associated with 'security' or the lessening of 'stress', then this is generally conducive to a low birth rate, but when the opposite occurs then this is generally detrimental to a low birth rate. This can be demonstrated by a simple education model showing the relationship between school education, wage earnings and birth rate; data from three tribal areas of Rhodesia show that the birth rate in families where the head is educated but can only secure low paid employment is significantly higher than the birth rate of educated family heads who are able to secure highly paid employment. There is, therefore, no simple correlation between birth rate, school education and income, but there is a significant relationship when the three variables are inter-related in terms of stress and security. Thus, the relationship between socio-economic status and family size (i.e. living children born to the family head and his wife) only becomes comprehensible when the variables denoting socio-economic status are inter-related to form a model which shows how these variables influence the population in terms of security and stress.

Secondly, the results of the Rhodesian project do not conflict with the findings from other countries. In fact the very opposite is true. For example, the Iranian findings, which Dunlop cited, themselves conclude that:

Although our tribal sample is not large enough to have our full confidence, these observations challenge the generality and universality of the conventional propositions postulating an inverse relationship between fertility and socio-economic status among different population sectors, at least within a country. One explanation may be that in the transitional period among developing populations, *the relationship between fertility and socio-economic indices is curvilinear. In other words, with the rise of socio-economic conditions fertility increases, but as socio-economic conditions continue rising, fertility declines.* To substantiate this observation, we require more detailed historical data.<sup>3</sup>

This observation is fully substantiated by the Rhodesian findings, and is clearly demonstrated by the Nutritional Stress Model now presented. Birth rate does in fact rise with increasing socio-economic conditions until subsistence status is reached. Thereafter there is a significant drop with increasing socio-economic development.

<sup>3</sup> Ibid., 161 (my emphasis).

Other comments concerning the Iranian findings are as follows:

The direction of the relationship (modern value orientation and socio-economic mobility) within the rural group in regard to fertility and life style is not quite clear. One plausible hypothesis being established in fertility-related studies is that the improvement of socio-economic conditions among non urban sectors of developing countries will improve the nutritional conditions of the rural population and this will reduce child mortality and raise the mean number of living children.<sup>4</sup>

Once again the Rhodesian findings fully substantiate this hypothesis. Reference to the Nutritional Stress Model shows that rising socio-economic conditions are in fact associated with improving nutrition and this does result in reduced child mortality and a rise in the mean number of living children, as is clearly demonstrated below in Figure 1.

The main difference between the Rhodesian and the Iranian projects lies only in the employment of different theoretical premises and measuring scales. Moreover, the 'stress security theory' used for the evaluation and interpretation of the Rhodesian data could perhaps also explain the lack of 'uniformity' and 'consistency' in the Iranian findings. The reason why, for example, 'high socio-economic mobility reduce[s] the high fertility, norms and practices amongst the urban Spirazi [but] seem to have a positive effect on the fertility patterns of the tribal population', can be explained by the theory if it is shown that 'socio-economic mobility' produces greater stress in the rural population by comparison with the urban.

Thus, the suggestion that the Rhodesian findings are 'positively dangerous' because they differ from other findings by showing a simple causal relationship where none is supposed to exist, is invalid. The causal relationship is not simple but based on systems of security and stress; and the two independent sets of findings in question are not different but remarkably complementary. But even if the Iranian and Rhodesian findings were basically different, it would be short sighted to arbitrarily dismiss one set of findings as less valid, for we are dealing with a dynamic human situation which differs from person to person, family to family, community to community, and nation to nation. The only way to break down barriers of prejudice and intolerance is through research—research to discover, investigate and explain these differences, for truth assumed and knowledge believed without the testing of reality can so easily lead to the degradation of society.

It is our sincere hope that the Rhodesian findings, together with the 'stress-security theory of adaptive behaviour' suggested by these findings, will stimulate further research and perhaps eventually provide the knowledge which will enable us to more effectively control our economic and political destiny for the benefit of all. What follows is an example of the type of research which should provide greater insight into the complexity of population growth.

Rhodesia, in common with most developing countries, is experiencing a high population growth rate of 3.6 per cent per annum which means a doubling of the population in nineteen years. In order to isolate and investigate

<sup>4</sup> Ibid., 166.

variables influencing the high birth rate, a family planning survey together with an agro-economic and health survey was administered in the Que Que Tribal Trust Land in 1972. Evidence from these surveys shows that the 'stress-security' variables influencing the nutritional status of rural families, such as highly productive vleis cultivation, livestock, school education, health, religion, and the residency and wage earnings of working family heads, are also important variables of population growth.<sup>5</sup> It would generally be agreed that the way in which these variables influence population growth is as follows:

In Western societies the higher socio-economic classes have smaller families than the lower classes, and in general the birth rate of these Western societies is progressively decreasing with increasing development. In an African society where, for economic reasons, family size is an important source of security and social status, adjustment towards a Western social model requires a transition from security, based on family size, to security based on education, property and money.

From this, however, it is sometimes assumed that the head and wife of better-adjusted families, with sufficient education, vleis land and livestock, to achieve a standard of nutrition above the subsistence level, will have fewer children born to them by comparison with the husband and wife of maladjusted families whose education, vleis land and livestock are inadequate and whose standard of nutrition is below the subsistence level. This general assumption, however, is not valid when tested by a Stress Security Model involving the use of a Nutritional Stress Scale applied to the data of the Que Que survey,<sup>6</sup> for this model in fact shows that with improving agro-economic conditions, the birth rate and family size actually increase until a subsistence level of nutrition is reached; and only thereafter is there a decrease in birth rate and family size with improving conditions (see Fig. 1). A statistical test also shows that there is no significant difference in family size (i.e. living children born to the head and his wife) when families are categorized as 'below subsistence' or 'stressed' or 'above subsistence' or 'secure'. However, a close examination of the evidence proves the following:

1. The highest birth rate occurs in families who are just at the subsistence level (i.e. in the third, middle, category (Figure 1);
2. In 'below subsistence' families fewer children are born and significantly more children die by comparison to 'subsistence' families, and this results in nuclear families which are smaller than the average; and
3. In 'above subsistence' families there is a lower birth rate, in association with lower death rate, by comparison with 'subsistence' families. This also results in nuclear families which are smaller than the average.

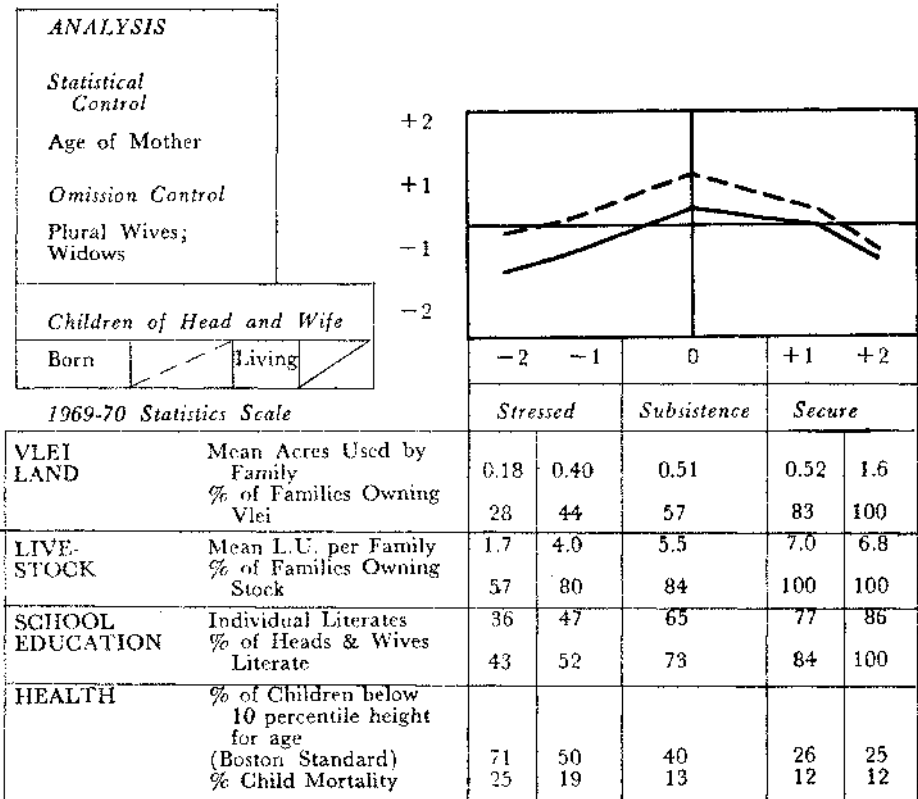
<sup>5</sup> These variables have been discussed in R. J. Theisen, 'Development in rural communities', *Zambezia* (1975-6) 4, ii, 93-7.

<sup>6</sup> For a brief description of the model, see *ibid*; the full details are to be found in my unpublished paper, 'The Cultivation of Vleis in a Tribal Trust Land' (mimeo).

Figure 1

## SECURITY AND BIRTH RATE

**HYPOTHESIS:** Better adjusted families with adequate education, vlei land and livestock, and who have an above-subsistence standard of nutrition, will have fewer children than maladjusted families with inadequate education, vlei land, and livestock and who have a below subsistence standard of nutrition.



**SIGNIFICANCE, EVALUATION AND CONCLUSION:** The hypothesis is not significant as both 'above subsistence' and 'below subsistence' families have more or less equal numbers of living children. However, further examination will show that population control can be affected in two ways: either through systems of stress and poverty when fertility declines and 'child mortality' increases; or through systems of security and plenitude when fertility declines and child survival increases.

**NOTE:**

<sup>1</sup> A health survey conducted in the Que Que Tribal Trust Land shows that the height or age rating of African school children is indicative of Protein Stress and the incidence of disease symptoms when values fall below the 10th percentile 'Boston Standards'; see M. Bohdal *et al.* 'A comparison of the nutritional indices in healthy African, Asian and European children', *Bulletin of the World Health Organisation*. (1969), 40, 166-76.

<sup>2</sup> Other variables such as religion and income from employment are also significantly related to nutritional stress and family size. As the influence of these variables, however, is not linear, a different stress model has been constructed to show these relationships, which I hope to publish later.

These conclusions suggest that:

Population control can be effected through stress and poverty, or through security and economic development; and security variables influencing the nutrition and economic status of the family are important variables of population growth which can be manipulated to promote economic development and a reduction in birth rate.

These findings can be explained from a security and a stress basis. In terms of security, a stress adjustment survey shows that the men and women of insecure families with below subsistence levels of livestock and land will generally make negative adjustments: these persons orientate their behaviour in accordance with their children who are their only source of security. On the other hand, better educated men and women who cultivate vlei land and who possess more than six head of cattle generally make positive adjustments: these persons tend to orientate their behaviour in accordance with the amount of livestock and acres of land they possess, and place less emphasis on family size.

It can be assumed therefore, that the husband and wife of insecure families will tend to develop unfavourable attitudes to limiting their children who provide their only form of security, while the heads of secure families, with vlei gardens and adequate livestock, are more likely to develop favourable attitudes to limiting their children who are no longer a vital source of security. The validity of this assumption has been partly confirmed by data from a Family Planning Survey which shows that the family planning attitudes of women in families who are above the subsistence level are significantly more favourable than the family planning attitudes of women in families who are at, or below, the subsistence level (at which level attitudes become undefined, being neither strongly negative nor positive).

These findings agree with the actual situation in respect of the number of children born to the wife, in that significantly fewer children are born in families which are above the subsistence level than in those at the subsistence level. The lower birth rate in 'below subsistence' families may be associated with low fertility induced by nutritional stress and is therefore physiological rather than psychological.

The influence of the above-mentioned stress-security variables on population growth can also be explained in terms of stress. Detailed observations of patterns of population growth indicate the existence of well-developed population growth modes in the community. Years of maximum population growth appear to coincide with periods of general stress and anxiety. This is illustrated by Figures 2 and 3, which show a significant increase in birth rate after the prohibition of vlei cultivation by the Lands Inspectorate, and after the Pearce Commission, respectively.<sup>7</sup>

<sup>7</sup> The unauthorized cultivation of wet land is illegal according to the Natural Resources (Protection) Regulations; see Rhodesia, *Government Gazette*, 14 June 1968, Rhodesia Government Notice No. 774.

Figure 2

## ECONOMIC STRESS AND BIRTH RATE

**HYPOTHESIS:** Inspectorate activity directed at removing vlei arable from cultivation will result in retrogressive development in above-subsistence families which could, according to the subsistence hypothesis, result in physical and mental stress sufficient in fact to promote an increase in the birth rate of the community to accommodate the threat to the survival of the family. Therefore significantly more children than the expected average will be born in the community during the year following the prohibition of vlei cultivation.

## ANALYSIS: VLEI ARABLE DEMARCATION

Agro-Economic Survey, Que Que T.T.L., 1970 and 1972			Family Planning Survey, Selukwe T.T.L., 1972		
Year	Births		Year	Births	
	Expected	Actual		Expected	Actual
1970	12	10	1969	25	25
1971	12	22	1970	25	37

**SIGNIFICANCE, EVALUATION AND CONCLUSION:** The hypothesis is significant at less than .01 (Kolmororov-Smirnov test).

Figure 3

## SOCIAL STRESS AND BIRTH RATE

**HYPOTHESIS:** The stress and anxiety resulting from the civil disorder at the time of the Pearce Commission will promote an increase in birth rate.

## ANALYSIS: CIVIL DISORDER AND BIRTH RATE

*Monomotapa Township, Gwelo; 1:3 Random Sample  
Agro-Economic Survey, 1973*

Year	1971						1972				1973		
	Sept.- Oct.	Nov.- Dec.	Jan.- Feb.	Mar.- Apr.	May- June	July- Aug.	Sept.- Oct.	Nov.- Dec.	Jan.- Feb.	Mar.- Apr.	May- June	July- Aug.	
Births	2	4	2	3	1	3	11	1	2	3	1	0	

**SIGNIFICANCE, EVALUATION AND CONCLUSION:** The hypothesis is significant at less than .01 (Kolmogorov-Smirnov test). Tension in Gwelo began to increase in December 1971 before the arrival of the Pearce Commission and it continued to increase until the riots of 16 January 1972. By the end of January the stress situation appeared to be returning to normal.\*

\* The sudden rise in birth rate during September and October 1972 coincides perfectly with the period of maximum stress and anxiety that occurred nine months earlier as a result of the Pearce Commission.

This suggests the presence of unconscious psycho-physiological causes which operate as a survival mechanism when family security and survival are threatened. In other words a natural survival mechanism involving a toning up of the hormone and nervous system may increase the fertility of the community in response to generalized stress and anxiety. This survival phenomenon apparently also operates on those at subsistence level when the survival of the family is threatened; this undoubtedly accounts for the high birth rate of subsistence rural families.

### CONCLUSION

A series of analyses based on the 'Nutritional Stress Scale' suggests that the aforementioned security variables interact to establish psycho-physiological processes which regulate the development of attitudes and motivation to govern the adjustment of the individual and family and the adaptation of the community. The lowest birth rate occurs in the 'above subsistence' families, but if the material and mental security of these families are threatened (i.e. by the prohibition of the use of vleis<sup>6</sup>) this is associated with an increase in birth rate. The highest birth rate and largest family size occur in 'subsistence' families, while in 'below subsistence' families the lower birth rate and smaller family size is apparently controlled by infertility and a high rate of child mortality.

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