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Commentary: Intrauterine nutrition may be important ▲

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Szent-Gyorgi wrote that "for every complex problem, there is a simple, easy to understand, incorrect answer." Hitherto, only simple explanations—such as the protective effects of red wine, garlic, or onions—have been brought forward to explain why French people have such low rates of coronary heart disease despite their "unhealthy" lifestyles. Not surprisingly, these simple ideas have not stood the test of time. Law and Wald have carried out a more subtle analysis. They conclude that, for the population of France, retribution has merely been postponed, and an epidemic of coronary heart disease is now approaching. Their hypothesis rests on the assumption that trends in the disease follow closely on trends in animal fat consumption and serum cholesterol concentrations, an assumption that can readily be challenged. Findings in the monitoring trends and determinants in cardiovascular disease (MONICA) study, for example, show that recent trends in coronary heart disease are only weakly related to trends in serum cholesterol.

An alternative explanation of the French paradox derives from recent research which suggests that coronary heart disease originates in utero, through adaptations that the fetus makes to undernutrition. [1](#) [2](#) According to this hypothesis, coronary heart disease "represents a stage of improving nutrition between chronic maternal malnutrition and nutrition at a plane that allows the mother to nourish her fetus adequately throughout gestation." Because fetal nutrition depends on the mother's body composition and size as well as her diet in pregnancy, optimal maternal nutrition depends on the nutrition of girls through childhood and adolescence as well as the nutrition of adult women.

Two hundred years ago the populations of Britain and France were chronically malnourished. It has been estimated that towards the end of the 18th century a person's average energy intake

in England was similar to that in India today, while that in France was lower, similar to that in Rwanda today.³ What Fogel has called "the escape from hunger" got under way in the 19th century, but, despite increasing food supplies in both countries, women, babies, and children remained poorly nourished. At the start of the 20th century, the poor physique of would-be army recruits enlisting to fight in the Boer war drew attention to the plight of Britain's youth. A committee set up in 1903 drew a shocking picture of our children—malnourished, deprived, and poorly housed.⁴ In the years up to the first world war, the report of this committee fuelled a series of public health programmes for infants and children, which included feeding of schoolchildren, promotion of breast feeding, and care of pregnant women.⁵ As this infant and child welfare movement developed in Britain, it had a useful role model—France.

The demoralising defeat in the Franco-Prussian war (1871) together with concerns about the small number of children in the country, through a combination of low birth rate and high infant mortality, led to fears that the French army would soon be inadequate and that France would cease to be a military power. Over the next 30 years various measures were introduced to protect the nutrition and health of the country's children. School meals were established: by 1904, when the *Lancet* sent a representative to Paris to report on this, a meal (soup, meat, and vegetables) was being provided to every schoolchild. In both Paris and the provinces there were infant welfare centres promoting breast feeding and, when this failed, providing sterilised cows' milk from milk depots. Communes were taking responsibility for the welfare of pregnant women. In the wake of the interdepartmental committee report, medical officers of health in Britain looked to "the French system" as they devised their own welfare programmes for infants and children.

Did better nourishment of girls, better nutrition in pregnancy, and better infant feeding protect the generations of French people born from the turn of the century onwards from coronary heart disease? Have the French population successfully "escaped from hunger" without an epidemic of coronary heart disease by focusing improved nutrition on mothers, babies, and young children? If so, this is an important message for countries like India, where coronary heart disease is now epidemic and is rapidly becoming the commonest cause of death.

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Commentary: Heterogeneity of populations should be taken into account ▲

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Law and Wald suggest that the "French paradox" can be explained by their time lag hypothesis —that decades of exposure to high dietary saturated fat and serum cholesterol concentrations must elapse before risk of mortality from ischaemic heart disease starts to rise. The observations that have given rise to the notion of a French paradox and inspired Law and Wald's hypothesis are all based on national averages: national mortalities from heart disease and average prevalences of risk factors. The figures are stratified by sex, but there is no allowance for the regional and socioeconomic variations that characterise the occurrence of heart disease and its risk factors. ¹ ² There are several reasons why this is problematic.

Firstly, the heterogeneity of populations may make it difficult to obtain valid estimates of national averages of risk factor levels. Law and Wald have drawn on a wide variety of sources, particularly for serum cholesterol concentrations. Among their sources, they have included regional studies (such as French studies from Ile-de-France and Alsace) and studies among specific socioeconomic groups (such as studies on civil servants and employees in Italy). They do not explain how they derived their national averages, but it is likely that these (weighted?) averages have non-negligible margins of uncertainty.

Secondly, regional and socioeconomic variations will affect behavioural patterns generally and