In historical accounts of the circumstances of ordinary people's lives, nutrition has been the great unknown. Nearly impossible to measure or assess directly, it has nonetheless been held responsible for the declining mortality rates of the nineteenth century as well as being a major factor in the gap in living standards, morbidity and mortality between rich and poor. The measurement of height is a means of the direct assessment of nutritional status.

This important and innovative new study uses a wealth of military and philanthropic data to establish the changing heights of Britons during the period of industrialisation, and thus establishes an important new dimension to the long-standing controversy about living standards during the Industrial Revolution. Sophisticated quantitative analysis enables the authors to present some striking new conclusions about the actual physical status of the British people during a period of profound social and economic upheaval, and *Height, Health and History* will provide an invigorating statistical edge to many current debates about the history of the human body itself.

RODERICK FLOUD is Provost of City of London Polytechnic
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ANNABEL GREGORY Computing Adviser for the Arts at Birkbeck College, London

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Height, health and history

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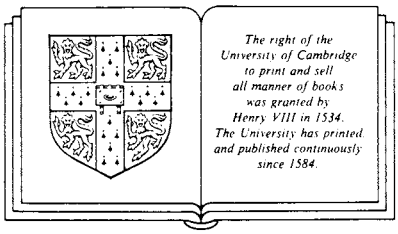
Height, health and history

Nutritional status in the United Kingdom, 1750–1980

RODERICK FLOUD, KENNETH WACHTER
and ANNABEL GREGORY



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(Resolution adopted October 25, 1926, as revised through September 30, 1974)

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To Bob and Enid

Preface

One of the most striking features of the demographic history of North America, as of many other developed countries, has been the fall in mortality levels between the eighteenth and the twentieth centuries. This fall requires documentation and explanation; both were the task of a research programme begun in the late 1970s, under the auspices of the National Bureau of Economic Research, into 'The Decline of Mortality in North America'. But, as Robert Fogel, who inspired the research programme, soon recognised, explanation of the fall in American mortality involved a search beyond North America; from the beginning of settlement until the First World War, the millions of immigrants who settled in the new world brought with them the culture, the habits of diet and of clothing and the health which they had acquired in the old.

Any explanation of the decline in mortality thus had to confront the question of how far the mortality levels of North America should be attributed to the health of the immigrants and of their immediate descendants who shared their customs and how far to the environment which they found in their new country. But to answer such a question required in its turn knowledge of the environment which they had left and which, in conjunction with their incomes and habits, had shaped their health. For much of the history of North America, this meant knowledge of the health and environment of the peoples of Britain and Ireland, from whom the vast majority of immigrants were drawn.

But it was also necessary to find some way of judging that health and environment and of comparing it to the health and environment of the peoples of other countries. Conventional measures of welfare, such as real wages, the level of infant mortality or the level of life expectation, were insufficiently comprehensive to provide what was

needed, a general indication of the health of the migrants and of their ability to withstand the pressures of the new life which they would be required to lead. It was in searching for such an indication that Robert Fogel began to explore the potential of anthropometric measurements and their relationship to health and nutrition.

Fogel was not in fact the first historian to make use of anthropometry, since Emmanuel le Roy Ladurie had used the records of French conscripts to describe the physical characteristics of Frenchmen in the early nineteenth century (1973). But Fogel's use of anthropometric material, gathered by himself, Stanley Engerman and Marilyn Coopersmith from the records of the Royal Marines in the Public Record Office, represented the first attempt to use such material – in particular the records of the heights of recruits – for comparative purposes and in the study of economic history and historical demography.

It was at Fogel's suggestion that the research which is described here began; it was matched by similar research in the archives of the United States, in the records of the British West Indian colonies and, later, in the records of Sweden and of Austria–Hungary. As the research developed, and as the full potential of anthropometric data in studies in economic history and demography was realised, the original purpose of the research in Britain – to contribute to the mortality history of the United States – became secondary to the study of British height data for the light that it could throw on the British economy and on the health and nutritional status of the people of Britain and Ireland.

The British research would, however, have been impossible without the encouragement and support of Robert Fogel and of the other members of the research programme on the 'Development of the American Economy,' who have worked on similar problems, shared their insights and given freely of their time and critical abilities in helping to shape the research and this book itself. Lance Davis, Stanley Engerman, Gerald Friedman, Robert Margo, Kenneth Sokoloff, Richard Steckel, James Trussell and Georgia Villaflor deserve special mention, but we are also grateful to other participants at the National Bureau of Economic Research summer workshop in 1987, and to John Komlos and Sidney Rosenbaum, who commented on early drafts.

We have also received most generous support and constructive criticism from many who are more expert than we in the various fields of study which are represented in this interdisciplinary work. James Tanner has put his unrivalled knowledge of both auxology – the study of human growth – and of its history unstintingly at our service and has saved us from many errors. Harvey Goldstein and Michael Healy

gave generous and useful statistical advice. Paul David, Alexander Field, Philip Payne, Johan Pottier, Peter Solar and Simon Strickland have been particularly helpful. We have also benefitted from the comments of many seminar participants at the universities of Berkeley, Cambridge, Durham, Edinburgh, Glasgow, Leeds, London, Oxford, St Andrews and Stanford and at the ESRC Cambridge Group for the History of Population and Social Structure, the London School of Hygiene and Tropical Medicine and St Thomas' Hospital, London. Initial results of the research were presented at the Boehringer-Ingelheim Symposium, at the International Economic History Conference at Budapest, at the Quantitative Economic History workshop and at conferences organised by the British Society for Population Studies, the Journal of Interdisciplinary History, the International Commission for the Application of Quantitative Methods to History, the Wellcome Foundation for the History of Medicine and the Social Science History Association. We are grateful to the organisers for their invitations and to the audiences for their comments.

Like much quantitative research in history and economics, the research reported here has required substantial financial support, which it has received from the British Academy and the Economic and Social Research Council in Britain (Research grants HR 7447 and G00230057) and from the National Science Foundation, the National Bureau of Economic Research and the Center for Population Economics at the University of Chicago, in the United States. We have also greatly benefited from the research and networking facilities of the National Bureau of Economic Research and the Centre for Economic Policy Research although, as with all publications under the auspices of these bodies, they are not responsible for the opinions which are expressed here. We have also received generous support from the University of California at Berkeley and especially its Committee for Research, and from Birkbeck College, London, which provided research assistance and two periods of research leave for Roderick Floud; one of those periods of leave was made both pleasant and productive by his appointment as a Visiting Professor in Economics and History at Stanford University.

The Public Record Office at Kew kindly allowed us to install and use cumbersome data entry terminals in its search-room. The Librarian of the Ministry of Defence acted as a guide through some especially arcane military records. The National Maritime Museum and the Marine Society of London provided easy access to the records of the Society. We are particularly grateful for research assistance in the collection and processing of data provided by Carl Boe, Catherine

Crawford, Judy Collingwood, Joseph Lau, Christophe LeFranc, Mary-Lou Legg, Barbara Neagle, Sunchai Rajadhon and Meta Zimmeck. Barbara Whitmore, Lin Bailey and Sheila Hailey entered the Marine Society data. We also thank Eleanor Thomas, who typed many of the tables, and Julia Peacock, who checked and collated the bibliography and tables. The staff of Cambridge University Press have tolerated delays and given much helpful advice.

Despite all this help, this book with its faults and lacunae remains our own. It is the first attempt to write the anthropometric history of Britain and Ireland over the last 250 years. It is unlikely to be the last, both because the potential of the study of human growth by historian and economist has not yet been fully realised and because, although this study breaks some new ground in the use of quantitative methods in the service of history, various aspects of the data remain unexplored. These data are available to any scholar who wishes to use them and it is our hope that they will be used and that this work stimulates similar studies of the anthropometric history of many other countries. Despite the many years which this study has taken, we remain intrigued and fascinated by the data and by the problems of the study of human growth and we hope that we have conveyed some of that fascination in this book.

We have not sought to write a history of human height in Britain for any period earlier than the eighteenth century. Many materials for such a study exist and some of them have recently been discussed by Kunitz (1987). They spring from the work of archaeologists, physical anthropologists, architectural historians and historians of armour. Despite the interest of such work and the actual and potential excitement of the use of information from suits of armour, heights of doorways, coffin sizes, cemeteries and the plague pits of seventeenth-century London, such studies would have taken us too far from our competencies as modern historian, statistician and historical anthropologist. We are grateful to all who suggested the use of such material and hope that it may be further collected and collated in the future.

One particular regret deserves emphasis. We have been able to say virtually nothing about the heights of women. Our sources are primarily military and do not contain any records of women; even when, as in the case of the Marine Society of London, some girls were recruited, they were not measured. Prison records do contain measurements of women but we chose not to use them on the basis, which was possibly mistaken, that such records could not be used as a basis for inference about the female population. Nor, because of our emphasis on males in our study of the eighteenth and nineteenth century,

have we considered evidence on the heights of girls and women in the twentieth century, although this has been done in a study associated with ours (Harris 1988). So this is a study of male heights; we can only hope to stimulate a companion study of the heights of females.

We have been particularly sustained, during the years of this study, by Cynthia Floud and Bernadette Bell, who have provided criticism of obscurity, succour in periods of irritation and elation, and hospitality for interminable discussions. Enid Fogel, too, has shown endless patience and encouragement and has helped us, and Bob Fogel, to keep a proper sense of proportion. We end this preface, as we began, with Robert Fogel. Not only did he inspire this study but he has encouraged it at all stages, has remained calm even when we despaired of finding a way through a statistical maze, and has both been a stern critic and one who has often been readier to see the potential and relevance of our work to historical problems than have we ourselves. It is because of their joint contribution that we are delighted to dedicate this book to our two friends, Bob and Enid.

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Birkbeck College, London