

# The Biodemography of Subsistence Farming

Population, Food and Family

Viewing the subsistence farm as primarily a "demographic enterprise" to create and support a family, this book offers an integrated view of the demography and ecology of preindustrial farming. Taking an interdisciplinary perspective, it examines how traditional farming practices interact with demographic processes such as childbearing, death and family formation. It includes topics such as household nutrition, physiological work capacity, health and resistance to infectious diseases, as well as reproductive performance and mortality. The book argues that the farming household is the most informative scale at which to study the biodemography and physiological ecology of preindustrial, noncommercial agriculture. It offers a balanced appraisal of the farming system, considering its strengths and limitations, as well as the implications of viewing it as a "demographic enterprise" rather than an economic one. A valuable resource for graduate students and researchers in biological and physical anthropology, cultural anthropology, natural resource management, agriculture and ecology.

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# The Biodemography of Subsistence Farming

Population, Food and Family

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With love, once again, for

PLJ

"We have all of us been told that grace is to be found in this world. But in our human foolishness and short-sightedness we imagine grace to be finite. For this reason we tremble... We tremble before making our choice in life, and after having made it again tremble in fear of having chosen wrong. But the moment comes when our eyes are opened, and we see that grace is infinite.... Grace, brothers, makes no conditions and singles out none of us in particular; grace takes us all to its bosom and proclaims general amnesty. See! that which we have chosen is given us, and that which we have refused is, also and at the same time, granted us. Aye, that which we have rejected is poured upon us abundantly. For mercy and truth have met together, and righteousness and bliss have kissed one another." – Isak Dinesen (Karen Blixen, Babette's Feast)





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# **Preface**

At the end of the seventeenth century [in rural France], the life of the average family head, who had married for the first time at age 27, could be summarized as follows:

He was born into a family of five children, only half of whom reached the age of 15. Like his father, he too had five children, of whom again only two or three were still alive when he died. This man lived to an average age of 52 – which placed him among the venerable elderly, for only 205 out of every thousand males born reached 52 years. Just within the circle of his own immediate family, he outlived an average of nine persons: one of his grandparents (the other three having died before he was born), both of his parents, three of his siblings, and three of his own children. He had lived through two or three famines as well as three or four periods of high-priced grain, which were tied to the poor harvests that on average recurred every ten years. Moreover, he had witnessed serious illnesses in his parents, his brothers and sisters, his wife (or wives if he had been widowed and remarried), and his children. And he had experienced several such illnesses himself, having survived two or three epidemics as well as more or less endemic whooping cough, scarlet fever, diphtheria, and so on, which each year claimed their victims. He had often suffered from physical ailments such as toothache and wounds that took a long time to heal. Poverty, disabilities, and suffering were constantly before his eyes.

Death was at the center of life, just as the church cemetery was at the center of the village. A child's average age when the first of his parents died was 14 years. Men of 25 to 30 – already scarred by harsh experience and motivated much more by enduring family needs than by the superficial attractions of physical beauty or a pleasant personality – contracted marriages that, though broken only by death, lasted on average less than twenty years. – J. Fourastié (1959), translated by W. Petersen (1972)

This book is about traditional, preindustrial farming and how it interacts with demographic processes and events like those mentioned in the passage above. Population size and composition (and changes in those variables) are matters of interest, as are demographic events such as births, deaths, marriages and shifts in residence or migration. The primary link between traditional farming and demography is, of course, food – and the ecology of food production and its implications for the nutrition, health, demography and behavior of preindustrial farmers are all central to this book. Another central issue has to do with identifying the most informative scale at which to study all these phenomena. I take a strong position on this particular question, arguing that the traditional farming household, its members and its farm are the right place to ground (but not necessarily to end) our analyses. If the farming household in question is not just traditional but largely subsistence-oriented, then I would (and do) argue that the household is essentially a demographic enterprise – its fundamental goal is to produce and support a family – and not strictly an economic one, as has generally been assumed in the past. Finally,



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I argue that traditional farming cannot be understood if the members of the farming household are not viewed as conscious agents and decision-makers (albeit not omniscient, omnipotent or omnicompetent ones). A large part of the book involves an exploration of the many implications that follow from adopting this perspective.

By convention, the academic study of traditional farming falls mostly within the bailiwicks of cultural and social anthropology, archaeology, cultural geography and a few other social sciences. I draw upon all these fields and more. But I want to make it clear at the outset that I am a biological anthropologist - and a trained demographer/population biologist. Those biographical facts by themselves mean that this book is rather different from other available treatments of traditional farming. Most fundamentally, I am primarily interested in the biodemography and physiological ecology of farming households - encompassing things such as household nutritional status, physiological work capacity, immune function and resistance to infectious diseases, other aspects of health and morbidity, reproductive performance and mortality, especially mortality among young children, often the most vulnerable members of the household. These things are all, as I hope to show, profoundly important to the success or failure of the household demographic enterprise. Farming behavior (and its social and cultural determinants) is also important to the book, but my approach is perhaps less akin to that of a conventional social scientist and closer to that of a behavioral ecologist, cultural evolutionist or niche constructionist.<sup>1</sup> I have also included a certain amount of relevant crop physiology, ecology and genetics, though written for the broad-minded social or anthropological scientist rather than for experts in those particular areas of agronomy.

Even though I am a biological anthropologist and my concerns are primarily biological, my book draws heavily on what is known as the *ethnographic record*, especially the many reports, written mostly by cultural and social anthropologists, that have been produced over the past century or so on small-scale, kin-based, geographically isolated, traditional ("unacculturated") farming communities. The ethnographic record is one of the most significant contributions of anthropology to human knowledge. To me, it is just as important as, say, the archaeological record or the fossil evidence for human evolution. But the older ethnographic literature is now in danger of being lost – not because of fire or decay but owing to a lack of interest. Almost every week I come across yet another academic library that has deaccessioned a classic ethnographic account or has moved it to deep storage because no one has checked it out in years. Fewer and fewer students of anthropology are reading the ethnographic literature. More and more anthropologists, including senior scholars who should know better, are willing to make sweeping statements about the ecology and evolution of human behavior that fly in the face of what we have known for

<sup>&</sup>lt;sup>1</sup> See Kennett and Winterhalder (2006), Boyd *et al.* (2011) and Kendal *et al.* (2011). I consider the still-youthful fields of behavioral ecology, cultural evolution and niche construction to be very promising as potential sources of ideas for the study of traditional farming practices. But I also think that theoreticians in those fields are still in the process of working out the fundamentals (see, for example, Claidière and André, 2012). Their main impact is likely to be in the future.



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decades from ethnographic research. This problem is especially troubling because the opportunity to study relatively "undisturbed" traditional societies is rapidly being lost - perhaps has already been lost - to the forces of globalization, the breakdown of geographical isolation, the influence of powerful metropoles, anthropogenic climate change and so forth. True, ethnographic field research continues, but increasingly it is forced to deal with all the external economic and political influences that constrain the actions and choices of local people. The study of "primitive man" (a term with more than one unfortunate connotation) was once considered the very heart and soul of anthropology. That time has passed, and mostly we should be glad of it, but so has "primitive man" himself, or, more accurately and less offensively, the relatively autonomous traditional communities of subsistence farmers, herders, and huntergatherers who needed to adapt above all else to their local environments and their local neighbors rather than the global market. It would be a shame if the existing works describing such communities were also lost out of mere inadvertence or a snobbish attitude that such works are old-fashioned. As detailed in the Appendix to this volume, I have read numerous ethnographic accounts of traditional farming in preparing to write the book, some of them quite old. If, by doing so, I have helped save them from oblivion, I will consider the effort well worthwhile.

I do not, however, pretend to have summarized the ethnographic literature (or the historical or geographical or any other literature) in all its rich empirical detail. Rather, I have focused my attention on that literature by viewing it through the lenses provided by various theoretical models – simplified conceptual schemes that can be used (and then discarded) to help us tease apart and understand the complex ethnographic and historical reality. My own approach to modeling follows in the tradition of the early nineteenth-century economic geographer Johann Heinrich von Thünen, whose work is discussed at the end of Chapter 1. (Like von Thünen's, my models will be graphical and verbal and only very rarely mathematical. Mathophobes need not panic.) Three model-inspired simplifications will appear again and again in this book: (i) a focus on subsistence farming rather than production for the market or some larger social/economic/political system, (ii) an assumption that individual subsistence farms are largely autonomous when it comes to food production and consumption, and (iii) the notion, already mentioned, that the subsistence farming household is at heart a demographic enterprise. None of these three simplifications provides an altogether true or complete picture of reality, as is acknowledged throughout the book, but all are useful in helping to narrow my enquiry into what would otherwise be a vast and untamable subject.

This book was written with a broad, but mostly professional audience in mind. I have used the material in it (including drafts of chapters) in a graduate-level course to which I admit a few, selected upper-class undergraduates. They all seem to be able to handle – I would even say enjoy – the book. Graduate students and postgraduate scholars in anthropology, archaeology, geography, economics, demography, population ecology, agronomy, economic and agrarian history, nutritional science, epidemiology and related fields should be able to find much of interest in the book, much to disagree with and (I would hope) much to learn from it. Technical material



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inevitably pops up, but I try to make my treatment of it as self-contained and self-explanatory as possible. I am a great believer in clarity as a principal goal of scientific writing, and I would be disappointed to learn that I have failed to reach that goal in this book. So far, my various readers seem to think I'm doing all right.

Writing this book has often lured me beyond the boundaries of my everyday professional expertise. That's fine: I like to think that all my work is inter-disciplinary in character, and besides I've learned a lot from the exercise. But it means that I've been sorely dependent on colleagues whose research overlaps only partially (if at all) with my own to read and critique the manuscript as it has evolved. Pat Johnson has carefully read everything.<sup>2</sup> Anne Buchanan has carefully read almost everything, and Sarah McClure and Tim Murtha only slightly less. I am grateful for (and more than a little humbled by) their critical comments - though I plot my revenge for the amount of rethinking and rewriting they forced me to do. Selected chapters have been vetted by Julia Jennings, Daniel Parker, David Webster and Ken Hirth. Over the years, I've benefited from discussions with George Milner, Jesper Boldsen, Darryl Holman, Sharon DeWitte, Rebecca Ferrell, Tim Gage, Lee Newsom, Carrie Hritz, Shinsuke Tomita, Ken Weiss, Rob Griffin, Craig Gerlach, Paul Gepts and Glenn Stone, as well as the eight colleagues already mentioned. In addition, I owe a lot to my students in Anthropology 575 ("Population, Food and Traditional Agriculture") at Penn State for their feedback, insights, requests for clarification and occasional gripes, especially Heath Anderson, Gina Buckley, Aurelio Lopez Corral, Anne Delessio-Parson, Lily Doershuk, Eric Dyrdahl, Richard George, Sara Getz, Sam Goodley, Heather Hilson, Sean Hixon, Nadia Johnson, Emily Kate, Saige Kelmelis, Alex Kinyck, Logan Kistler, Kendall McGill, Montira Mahinchai, Michael Marin, Andres Mejia-Ramon, Lauramarie Pope, Casana Popp, Andrew Purrington, Aliza Richman, Dominica Stricklin, Simone Sukhdeo, Anna Tremblay, Ashish Tyagi, Lindsay Usher, Mark Van Horn, Ziyu (Raining) Wang, Martin Welker and John Wheatley, whose backgrounds span cultural and biological anthropology, archaeology, paleoethnobotany, demography, agricultural economics, rural sociology, even leisure studies (the latter were great on the energetics of farm work). Many thanks as well to Ellen Weiss and Tara Mazurczyk for getting the figures ready for publication, and to Emily Kate for laying the groundwork for the permission letters. Special thanks go to Anna Tremblay, who did most of the arduous task of getting permissions for the figures, who compiled the index, and who saw the manuscript through until it was in the publisher's hands. I also thank the life sciences editors at Cambridge, Martin Griffiths, Lynette Talbot, Ilaria Tassistro, Victoria Parrin and Jenny van der Meijden, for believing in this project from an early stage and guiding its production with unfailing cheerfulness. Looking back over my career, I realize that I owe old and profound debts to the late Skip Rappaport, who introduced me to the ecology of traditional farming (although he would probably have disagreed with most of what's in this book), and the late Frank Livingstone, who provided me with my first exposure to population science

<sup>&</sup>lt;sup>2</sup> Professor Johnson has asked me to add the following statement: "All that I am, or hope to be, I owe to my angel wife." Frankly, I think this is damning her with faint praise.



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(although he would probably have pretended to disagree with everything in this book just to keep me on my toes). I also want to thank my friend Douglas Leslie, a farmer on the peedie isle of Westray in Scotland's northern Orkney Islands, for innumerable winter-time discussions about the ways of farming (he is just too busy during the summer). Douglas's expertise was perhaps more useful than anyone else's – he taught me at least a wee bit about how to think like a farmer, not to mention about the cosmic importance of muck. Finally, I owe quite tangible debts to the National Science Foundation (specifically the Physical Anthropology panel and the program on Human Dimensions of Global Change), the National Institutes of Health (especially the National Institute for Child Health and Human Development and the National Institute on Aging) and the Andrew W. Mellon Foundation for supporting my research over the years on topics related to this book. But please note: I steadfastly maintain my right and ability to make my own stupid mistakes. Therefore, I cannot in good conscience blame any of these people or agencies for the numerous errors that doubtless remain in the book. I own up to all of them. All I ask is that any readers who spot them please let me know at jww3@psu.edu.

A brief comment on notation. Except when quoting other authors, I try to be consistent in using metric (SI) units of measurement – with one exception. Instead of using joules for energy, I use the more familiar calorie or, more accurately, the kilocalorie or "food calorie" (1 kcal = 1000 cal). I avoid the old convention of writing Calories for kilocalories and calories for "small" calories (what the heck do you do when the word begins a sentence?). For those wishing to convert everything to SI units, one kilocalorie is roughly 4200 joules or 4.2 kJ.

Finally, an aesthetic point. I am not the sort of anthropologist who views preindustrial people as bloodless Others who spend most of their everyday lives performing rituals, enacting tropes or topoi, or expressing deep cultural themes or symbols. I prefer to think of them as sentient creatures (like ourselves) who sweat and lust, who dig in the dirt and muck out byres and stables, who experience pain, hunger, fear, grief and love, who piss, shit, bleed and do all manner of other nonliterary things. To me, muck is richer than metaphor. In writing this book, I did not set out deliberately to express this aesthetic preference – but deep down I hope I've managed to do so anyway.

