

Population Studies: A Journal of Demography

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rpst20>

Ten Thousand Tonga: A Longitudinal Anthropological Study from Southern Zambia, 1956-1991

Sam Clark ^a, Elizabeth Colson ^b, James Lee ^c & Thayer Scudder ^c

^a University of Pennsylvania.

^b University of California.

^c California Institute of Technology.

Published online: 04 Jun 2010.

To cite this article: Sam Clark, Elizabeth Colson, James Lee & Thayer Scudder (1995) Ten Thousand Tonga: A Longitudinal Anthropological Study from Southern Zambia, 1956-1991, Population Studies: A Journal of Demography, 49:1, 91-109, DOI: [10.1080/0032472031000148266](https://doi.org/10.1080/0032472031000148266)

To link to this article: <http://dx.doi.org/10.1080/0032472031000148266>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms

Ten Thousand Tonga: A Longitudinal Anthropological Study from Southern Zambia, 1956–1991*

SAM CLARK,[†] ELIZABETH COLSON,[‡] JAMES LEE§
AND THAYER SCUDDER§

INTRODUCTION

With the advent of large-scale modern surveys during the last 15 years, a wide variety of demographic information has become available for sub-Saharan Africa. Nevertheless, national censuses remain inaccurate, and civil registration is still virtually non-existent. Many people are illiterate, and what survey data are available are highly dependent upon such people's ability to recall accurately their personal demographic history. As a result, Africa remains the least-known contemporary continental population, while African population history, especially sub-Saharan African population history, is largely blank before 1977.¹

Fortunately, several long-term micro-studies exist for Africa, carried out by anthropologists who made repeated visits to the same communities, and used census techniques to explore the changing nature of communities and their adaptation to ecological, economic, and social conditions.² Demographic data can then be examined against other fine-grained ethnographic information. Moreover, as several of these studies are longitudinal, it is possible to follow people from birth, to examine changes in their expectations as they obtain education and as they age, and to come nearer to the considerations that lead them to decisions that determine the demographic future of the continent.

In this paper we introduce one such study, that of Gwembe District, Southern Province, in the Middle Zambezi Valley, Zambia, which now demarcates the

* The Institute for African Studies of the University of Zambia (formerly the Rhodes–Livingstone Institute) has been the main sponsor of the Gwembe Study since its inception in 1956. In addition, the University of California; the California Institute of Technology, the Social Science Research Council, the American Council of Learned Societies, the National Institutes of Health, the Food and Agriculture Organization of the United Nations, the John Simon Guggenheim Memorial Foundation, Harvest Help, United Kingdom, and the National Science Foundation also provided financial assistance. We would like to thank all these organizations, as well as Douglas White for his collaboration, and Cameron Campbell for his contributions to our analysis. In addition, George Alter, Cameron Campbell, John Cleland, Barney Cohen, E. A. Hammel, Althea Hill, David Kertzer, William Lavelly, Emiko Ochiai, Samuel Preston, A. F. Robertson, Osamu Saito, and Roger Schofield commented extensively on the manuscript for which we are very grateful.

[†] University of Pennsylvania.

[‡] University of California.

[§] California Institute of Technology.

¹ See K. de Graft-Johnson, 'Demographic data collection in Africa', in Etienne van de Walle, Patrick Ohadike, and Mpembele Sala-Diakanda (eds), *The State of African Demography* (Oxford University Press, 1988), pp. 13–28 for a comprehensive survey of demographic data collection in Africa. See too the dozen articles in volume 1 of *African Population Conference* (Dakar Senegal: International Union for the Scientific Study of Population, 1988) on the many problems with contemporary African registration and census systems.

² N. Howell, *The Demography of the Dobe !Kung* (New York: Academic Press, 1979); R. Lee, *The !Kung San: Men, Women and Work in a Foraging Society* (Cambridge: Cambridge University Press, 1992); and E. Wilmsen, *Land Filled with Flies: A Political Economy of the Kalahari* (Chicago: University of Chicago Press, 1989).

international boundary between Zambia and Zimbabwe. Our paper is divided into six parts. In Parts 1 and 2, we briefly describe the Gwembe study and the history of the Tonga population. In Parts 3, 4, and 5, we examine in succession the patterns of nuptiality, fertility, and mortality and situate them both in regard to neighbouring African populations and to the history of Zambia, and Gwembe District in particular. Finally in Part 6, we analyse the sex patterns of mortality and demonstrate how the matrilineal biases of Tonga society can result in excess mortality of men.

THE GWEMBE STUDY

The Gwembe study is one of the oldest longitudinal African studies,³ having been initiated in 1956 by Elizabeth Colson and Thayer Scudder to study the impact of resettlement associated with the creation of Lake Kariba, once the largest artificial lake in the world.⁴ Initially, seven villages were chosen as demographic survey sites, but as the study progressed, the number of village sites was reduced to four, the locations of which, before and after resettlement, are shown on Map 1. Two of the four villages, Sinafala and Siameja, moved relatively short distances and were relocated near or a few miles above Lake Kariba. The other two villages, Mazulu and Musulumba, however, had to move approximately 100 miles downstream below the dam.

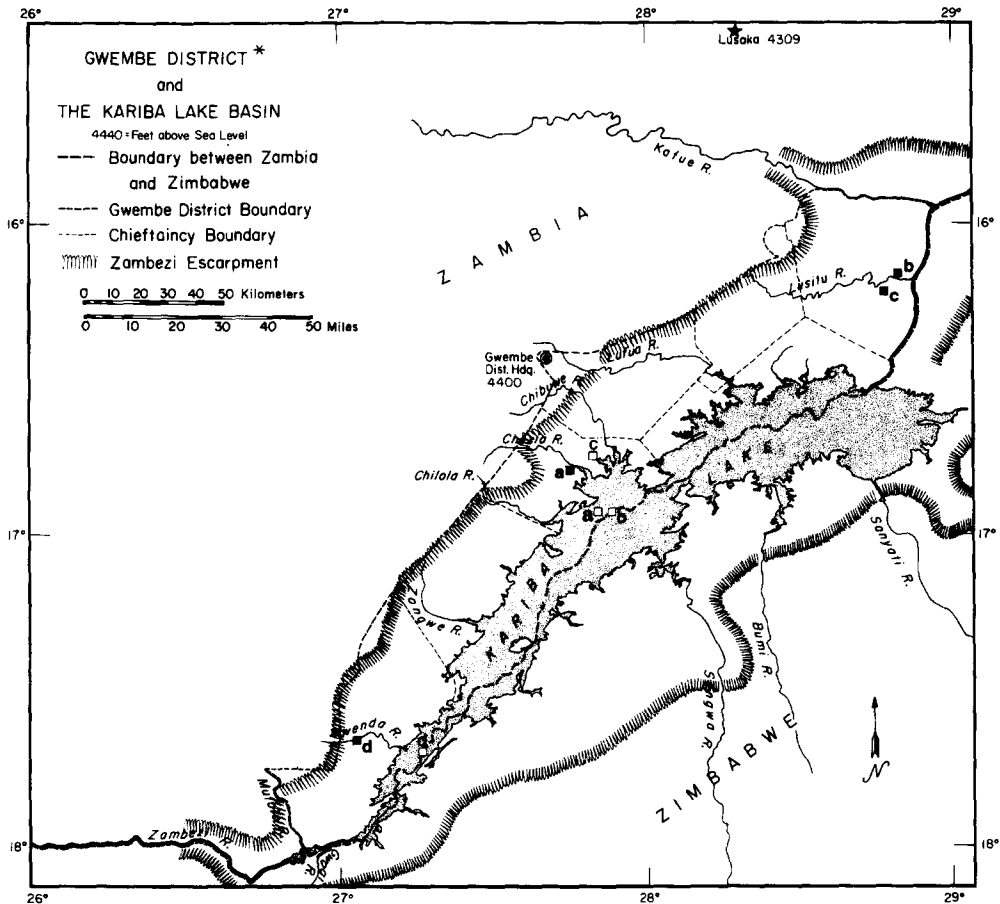
Altogether, Colson, Scudder, and their associates have made almost 30 visits to the Gwembe, totalling over 4,000 person-days during which they collected information on the 10,000 Tonga who are the subjects of this study. The longest interval between visits extends from 1957 to 1962. Since then, long periods of fieldwork, approximately five to ten years apart, have been supplemented by short visits lasting from a few days to several months.⁵ In addition, during the last 20 years, local assistants in Mazulu, Musulumba, and Sinafala have recorded births, deaths, marriages, and divorces, and kept logs of daily events to supplement field interviews.⁶

³ The only other comparable studies are the British Medical Research Council's longitudinal study of Keneba village in the West Kiang District of the Gambia in West Africa which began in 1950 and the Institut Français de Recherche pour le Développement en Coopération's longitudinal study of Ngayokheme in Senegal in West Africa – see I. McGregor, 'Morbidity and mortality at Keneba, the Gambia, 1950–75', in R. Feachem and D. Jamison (eds), *Disease and Mortality in Sub-Saharan Africa* (Oxford: Oxford University Press, 1991), pp. 306–24, and P. Cantrelle, *Étude démographique dans la région du Siné-Saloum (Sénégal): État Civil et Observation Démographique* (Paris: Travaux et Documents de l'ORSTOM, no 1. 1969). We would like to thank Barney Cohen and Althea Hill for bringing the Keneba Project to our attention.

⁴ See T. Scudder and E. Colson, 'Long term research in Gwembe Valley, Zambia', in George M. Foster *et al.* (eds), *Long Term Research in Anthropology* (New York: Academic Press, 1979). See also T. Scudder and E. Colson, 'The Kariba Dam project: resettlement and local initiative', in H. Russell Bernard and P. Pelto (eds), *Technology and Social Change* (New York: Macmillan, 1979). It was Henry Fosbrooke, the director of the then Rhodes-Livingstone Institute in 1955, who, on learning that Kariba Dam was to be built and village life disrupted, decided that ethnographic work must be undertaken both to document a way of life and to examine how people adapted to new environments. He obtained funding for Colson and Scudder's 1956–57 and 1962–63 studies which are described in detail in E. Colson, *Social Organization of the Gwembe Tonga* (Manchester: Manchester University Press, 1960); E. Colson, *The Social Consequences of Resettlement* (Manchester: Manchester University Press, 1971) and T. Scudder, *Ecology of the Gwembe Tonga* (Manchester: Manchester University Press, 1962).

⁵ All four village populations (Mazulu, Musulumba, and Sinafala, in their entirety, as well as slightly less than half of Siameja) were surveyed in 1956–57, 1962–63, 1972–73, 1981–82, 1987–88, and 1992. In addition, Colson updated the population information for Sinafala, Musulumba and the pertinent population in Siameja in 1965, while Scudder updated the population information for Mazulu in 1967, 1968, 1970, 1976, and 1990.

⁶ Local assistants include Senete Adam Sikagoma, 1977–81, and Bernard Siakanomba, 1981–92 for Mazulu; Christopher Kiwani, 1987, 1992, and Bernard Simalabali, 1987, 1992 for Musulumba; and Paul Siamwinga, 1973, 1981, 1987, Bunyika Chibilika, 1977 and Jelena Chasomba, 1973–83 for Sinafala. There are no assistants for Siameja. The completeness of demographic recording, however, varies by assistant and is most reliable for events within the village. In Mazulu, one of the best recorded villages, virtually all births and deaths were recorded – usually within one week of the event.



Map 1. Gwembe District and the Kariba Lake basin. Study villages: a, Sinafala 1956; a, Sinafala after resettlement; b, Mazulu 1956; b, Mazulu after resettlement; c, Musulumba 1956; c, Musulumba after resettlement; d, Siameja 1956; d, Siameja after resettlement. * Gwembe District was divided into three districts after 1992.

While the focus of anthropological fieldwork has been broad, Colson, Scudder, and their associates systematically collected demographic information, in addition to a variety of other socio-economic data.⁷ The primary demographic record for this fieldwork has been the 'census form' originally compiled during the initial visit in 1956 and 1957 and updated regularly thereafter. These forms are used to enumerate everyone associated with each village homestead and their birth dates, marriage dates, divorce dates, and death dates. Field investigators typically update these forms through personal interviews with each family, those present being asked for information on those absent. Each interview is usually attended by such members of the homestead as are present at the time. Most members know a great deal about each other and can corroborate or dispute dates associated with births, deaths, marriages, and divorces. They may be less knowledgeable about emigrants who have settled elsewhere, albeit mostly in the

⁷ In addition to the demographic data, Colson and Scudder collected data on education and residence in 1956–57, 1962–63, 1972–73, 1981–82, 1987–88, and 1992; as well as data on labour migration to 1981–82; and data on access to land, livestock, and other economic indicators through 1987–88.

immediate vicinity.⁸ In these cases face-to-face interviews have not always been possible and information has been obtained from close kin, to be checked later, if possible, with the individual or informants by mail.⁹

The demographic data, in other words, are the product of a process of continuous verification and refinement.¹⁰ However, since the census forms were designed principally as a tool to monitor the population and facilitate the acquisition of other types of information, they do not resemble standard demographic surveys. Moreover, while we have transferred all demographic information into machine-readable format, there is still significant information on education, migration, wealth, and other socio-economic indicators yet to be coded and analysed.¹¹ As a result, we confine ourselves in this paper to descriptive demographic statistics of the 10,000 Tonga for whom we have relatively complete demographic information from 1956 to 1991.

The quality of this information, in the Gwembe as elsewhere in sub-Saharan Africa, is constrained by the inability of members of any largely illiterate population to remember and to record precise dates and specific events. In 1956–57 only a small minority of Gwembe residents were literate in either chi-Tonga, the local language, or English, the national language. Even today, many Gwembe villagers of all ages are still illiterate. No serious attempt is made by government officials, including village headmen and personnel associated with local clinics, to record vital statistics. Ironically, therefore, villagers have come to value the Gwembe census forms because they provide an accurate source of family history. The Gwembe study has accustomed villagers at the very least to be aware of dates and in a growing number of cases to keep personal records. It is increasingly common to encounter someone who has recorded the birth, marriage, and death dates of their children in a school notebook or on a scrap of newspaper. Consequently, the more recent our demographic data, the more accurate and complete they are.

Nonetheless, relying on recall creates inaccuracies. In every village and time period, people may have underreported the births and deaths of male children, a discrepancy explicable in terms of the greater value placed on daughters. Furthermore, during each return visit we are reminded of the possibility for dating inaccuracies when informants dispute a date that we know to be accurate, because we were there, and recorded it at the time of the event. Only three-quarters of all individuals surveyed appear to have complete demographic information. And even these appearances may be misleading. Mortality, in particular that of the very elderly, is underreported, again largely a product of emigration.¹² Table 1 shows the population associated with each of the four villages

⁸ Since the Gwembe study was specifically designed to trace all residents from the four villages and their descendants, even if they emigrated, the final study population includes individuals resident in a wide variety of other locations.

⁹ Since the 1970s, paid assistants in Lusaka, the capital of Zambia, and in the Copper Mining Belt have periodically recorded demographic events for a portion of the emigrant population. While such reporting is less complete than the village reports, the data have provided an additional source of information.

¹⁰ When, for example, birth intervals are longer than we would expect, we re-check fertility histories carefully. Such re-checking has firmed up dating and filled in gaps in the record when information on miscarriages and children who died at birth or shortly thereafter has been omitted.

¹¹ We are currently coding data on education and residence to understand better the role of education and migration in demographic change. While wealth is undoubtedly at least as powerful an explanatory force we will not code these data immediately because of their complexity.

¹² We have encountered problems in recording the mortality of older emigrants, in particular of those who do not have close relatives still resident in the village to serve as potential informants. As a result, our estimate of old-age mortality is low. This problem seems to be confined largely to the elderly over age 50, and does not appear to influence our calculations of nuptiality and fertility, which are high. Nevertheless, we are embarking on a major study of residence to identify those people for whom data are potentially incomplete and plan to re-survey all emigrants resident near the villages, as well as in Lusaka.

Table 1. *Ten thousand Tonga: 1956, 1992* by village, sex, and quality of information*

Village of primary affiliation†	1956						1992					
	Raw			Clean			Raw			Clean		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Sinafala	152	249	401	108	161	269	790	972	1,762	681	799	1,480
Siameja	160	267	427	24	22	46	729	871	1,600	566	645	1,211
Musulumba	366	307	673	81	63	144	990	1,034	2,024	652	711	1,363
Mazulu	97	154	251	64	78	142	516	689	1,205	440	577	1,017
All four	775	977	1,752	277	324	601	3,025	3,566	6,591	2,339	2,732	5,071

* By 'raw' we mean the total population recorded on the census forms. For many of these people, however, vital information is incomplete or inaccurate, especially at the time of the beginning of this study. The 'clean' population are those people who reported a date of birth and possibly marriage and death, and whose information Colson and Scudder consider to be accurate and complete.

† The Gwembe study was designed to trace all residents from the four villages and their descendants, even if they emigrated. As a result, while the entire population was resident in one of the four villages in 1956, the population in 1992 includes individuals resident in a wide variety of other locations, albeit mostly in the immediate vicinity. Approximately half of the 'clean' 1992 population consists of village residents; the other half of largely nearby emigrants.

by sex in 1956 and 1992 at the beginning and end of this study (to date) and differentiates between the total 'raw' population surveyed and the actual 'clean' population susceptible to demographic analysis.¹³ While the size of the population varies according to the event under analysis, the total 'clean' population is 10,000.¹⁴

A BRIEF HISTORY OF THE GWEMBE

Colson and Scudder's principal motivation in pursuing such a painstaking longitudinal study has been a commitment to understand not just the processes of resettlement, but also the larger socio-economic changes set into motion at the time of Zambian independence in 1964. No regional study, of course, can represent the experience of an entire continent. Since independence, Gwembe people have been challenged continuously, first by economic expansion and subsequent collapse and more recently by drought and the arrival of AIDS. These experiences, however, are common to much of Africa. As we shall see, Gwembe demography is in many ways typical of Zambia, and to a lesser extent of the surrounding nations of Zimbabwe and Botswana. Overall, sub-Saharan Africa is characterized by high nuptiality, fertility, and mortality. No African nation has yet completed a fertility transition and mortality rates remain high. The Gwembe study has provided a unique opportunity to observe and record the cultural and demographic responses of a pre-transition population to specific events, and we believe that lessons learned there may be applied elsewhere in Africa and abroad.

We have organized the demographic analysis into three time periods based on the different effects associated with involuntary resettlement, economic expansion, and economic decline. The first period, the 'Period of Stress' was dominated by involuntary

¹³ By 'raw' we mean the total population recorded on the census forms. The 'clean' population consists of those people whose date of birth and possibly marriage and death are considered by Colson and Scudder to be accurate and complete.

¹⁴ Population size and statistical robustness, of course, increase over time. We, therefore list the number of cases at risk for each event in Figures 1-10.

resettlement from 1956 to 1962.¹⁵ This was followed by a 'Period of Prosperity', from 1963 to 1973, associated with the coming of political independence, and marked by rising living standards and economic growth. Government services expanded, with the provision of roads, schools, medical clinics, and agricultural extension. In addition, a highly profitable fishery sprang up around Lake Kariba by the 1960s.¹⁶ Educational and job opportunities increased considerably, creating an educated elite.¹⁷ These good years, however, ended in the mid-1970s. The major cause was the increasing bankruptcy of Zambia's political economy with the concomitant decline in public services and employment, and subsequent decrease in labour migration, all of which contributed to a precipitous degradation of Gwembe living conditions.¹⁸ Simultaneously, the war for Zimbabwean independence, waged throughout the 1970s, destabilized the Gwembe. Moreover, a series of natural disasters, beginning in the 1980s, intensified this 'Period of Decline'.¹⁹

By 1990, the mean income per head in Zambia as a whole was less than it was in 1970. Indeed, incomes have fallen so much that in Zambia today the proportion of rural population living below the poverty line is one of the highest in the world.²⁰ Such severe economic decline has resulted in community unravelling during the 1980s in the most seriously affected villages in the Gwembe.²¹ As the standard of living has dropped, the incidence of violence and prevalence of accusations of sorcery rose. In addition, the consumption of alcohol increased; and reports of alcohol-related violence, including murder, have become common. The government's growing inability to provide health services allowed the re-emergence of measles and an increase in the incidence of malaria, tuberculosis, schistosomiasis, and other parasitic diseases. During the last decade drug-resistant strains of malaria and tuberculosis have become common. In 1983, the first documented cases of AIDS appeared in Zambia; and in 1989, cholera appeared in the Gwembe for the first time.

To what extent, however, did these processes of change have demographic repercussions? Colson and Scudder's assumption has been that demographic behaviour would reflect the tumultuous changes that have afflicted the Tonga since 1956. They accordingly gathered demographic data for almost 40 years. While they have written extensively on the behavioural responses to these processes of change, they lacked the skills needed to analyse the demographic data systematically. These have been supplied by Lee and Clark.²² In the second half of this paper, we compare the overall levels of

¹⁵ See E. Colson, *op. cit.* in fn. 4; T. Scudder, 'Development induced relocation and refugee studies: thirty-seven years of change and continuity among Zambia's Gwembe Tonga', *Journal of Refugee Studies*, 6.2 (1993), pp. 123-152.

¹⁶ See T. Scudder and E. Colson, *loc. cit.* in fn. 4, pp. 39-69.

¹⁷ See T. Scudder and E. Colson, *Secondary Education and the Formation of an Elite: The Impact of Education on Gwembe District, Zambia* (New York: Academic Press, 1980).

¹⁸ *Basic Needs in an Economy Under Pressure* (Addis Ababa: International Labour Organization, 1981).

¹⁹ These natural disasters include severe drought between 1980 and 1984 as well as during the 1987-88 and 1991-92 seasons.

²⁰ *The State of World Poverty, An Inquiry into its Causes and Consequences* (Rome: International Fund for Agricultural Development, 1992).

²¹ See T. Scudder, 'Economic downturn and community unravelling', *Culture and Agriculture*, 18 (1983), pp. 16-19; and T. Scudder, 'Economic downturn and community unravelling, revisited', *Culture and Agriculture*, 23 (1984), pp. 6-10.

²² The process of coding, cleaning, and computation has been slow. An initial attempt in 1969-72 was unsatisfactory. The current paper dates back to 1987 when Scudder recruited James Lee, a social demographer, to assist with a revival of this process. Lee, in turn, recruited Cameron Campbell and Sam Clark. It was Campbell who did the initial database programming in 1988-89, and who working together with Lee, completed a very preliminary analysis of the pre-1987 data. It was Clark, however, who completed the coding in 1990-91, cleaned the data with Colson and Scudder in 1992-93, and re-worked the database programs in 1993-94. Lee and Clark together then did much of the demographic analysis in 1993-94, and working closely with Colson and Scudder, wrote up the results in 1994.

nuptiality, fertility, and mortality in the Gwembe villages with those in other African populations and trace their changes over time. The results, as we shall see, revise our understanding of Gwembe social processes; and in several cases uncover important aspects of social behaviour of which Colson and Scudder were previously unaware.

NUPTIALITY

Marriage is a good example. Throughout sub-Saharan Africa, marriage is both early and widespread for females.²³ This is as true of the Gwembe population, as elsewhere in Africa.²⁴ In Table 2 we compare age at first marriage and the proportions ever-

Table 2. *Nuptiality in Africa and the Gwembe*

Population	Proportion of ever-married women 40-44 (per cent)	Women's average age at first marriage (years)
Botswana*	81.5	17.4
Zimbabwe*	99.1	20.4
Zambia†	99.9	18.5
Gwembe	97	16.5

* George Acsadi and Gwendolyn Johnson-Acsadi (1988), 'Effects of timing of marriage on reproductive health', in G. T. F. Acsadi, G. Johnson-Acsadi, and R. Bulatao (eds), *Population Growth and Reproduction in Sub-Saharan Africa* (World Bank), pp. 105-114; Etienne, van de Walle (1993), 'Recent trends in marriage ages', in National Research Council. *loc. cit.* in fn. 23, pp. 117-152.

† K. Gaisie, A. R. Cross, and G. Nsamukila, *Zambia Demographic and Health Survey 1992* (Lusaka: University of Zambia and Central Statistical Office; Columbia, MD: Macro International, Inc.).

married at age 45, for females in the Gwembe with the female population of Zambia as a whole, and with two closely neighbouring populations, those of Botswana and Zimbabwe. The Gwembe leads the group. Women in the Gwembe marry young with a mean age at first marriage of 16.5. By age 45, fewer than three per cent of all women have never married. By contrast, the mean age at first marriage for men is 22 and the proportion of never-married men by age 45 is considerably higher.

In contrast with our expectations, however, first marriage rates in the Gwembe did not respond significantly to the sharp rise and fall in socio-economic conditions since 1956. Figure 1 depicts the rate of first marriages for unmarried men aged 15 to 45, by three-year periods from 1956 to 1991.²⁵ The first marriage rate for men has remained relatively

²³ See E. van de Walle, 'Recent trends in marriage ages', in National Research Council, *Demographic Changes in Sub-Saharan Africa* (Washington D.C.: National Academy Press, 1993), pp. 117-152. Recently, however, an increasing number of sub-Saharan African women have delayed marriage, especially if they live in the cities. See Antoine and Nanitelamio, 'More single women in African cities: Pikine, Abidjan, and Brazzaville', *Population: An English Selection*, 3 (1991), pp. 149-169. We would like to thank Barney Cohen for bringing this article to our attention.

²⁴ Marital relations in the Gwembe are exceedingly complex. Historically, marriage is polygynous and the customs governing the initiation and termination of marriages are flexible. In addition, the process by which marriages are contracted currently requires four separate marriage payments from the man, and can span a number of years. As a result, it is difficult to define a 'marriage date' clearly. Spouses may live together for years in a conjugal relationship that is not considered a formal marriage in the context of Gwembe society. In this article *marriage* means any arrangement that the Tonga consider to be a conjugal relationship and marriage dates are the dates when this conjugal relationship was initiated.

²⁵ Women's first marriage rates are far more complex than those of men for a variety of reasons, including polygyny. Moreover, women's divorce and remarriage rates are high and quite complex because of migration. We will not, therefore, present these data until we have completed our study of migration.

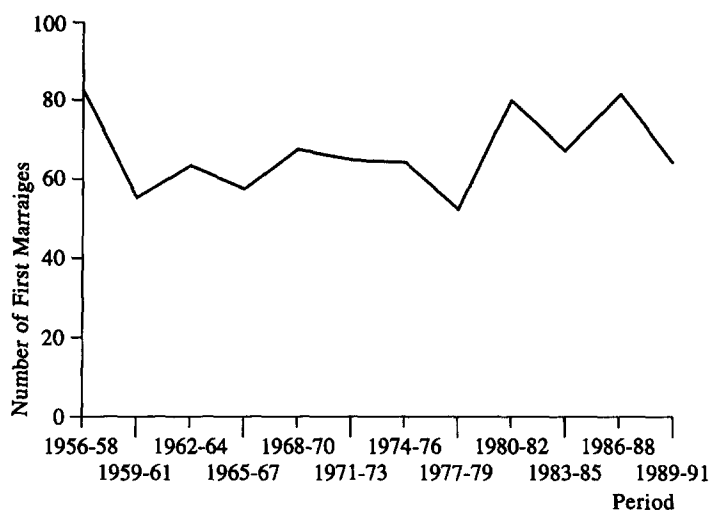


Figure 1. First marriage of men in the Gwembe. First marriages per 1000 unmarried man-years (aged 15-50). Unmarried men's person-years at risk by period: 1956-58 = 508; 1959-61 = 530; 1962-64 = 587; 1965-67 = 682; 1968-70 = 744; 1971-73 = 802; 1974-76 = 967; 1977-79 = 1137; 1980-82 = 1254; 1983-85 = 1289; 1986-88 = 1393; 1989-1991 = 1408.

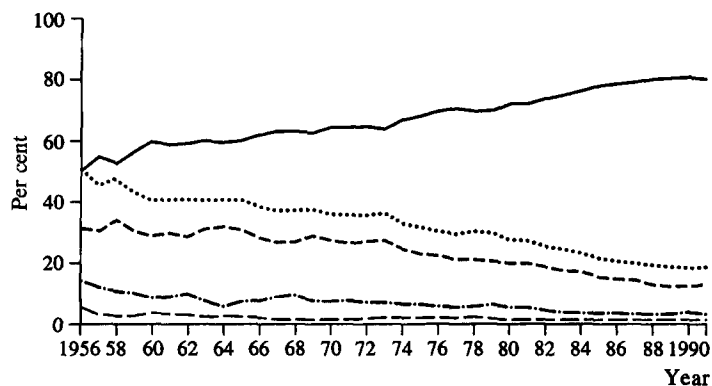


Figure 2. The rise of monogamy in the Gwembe. Percentage of married men with X wives. Married men at risk by year: 1956 = 140; 1957 = 162; 1958 = 169; 1959 = 172; 1960 = 179; 1961 = 190; 1962 = 197; 1963 = 215; 1964 = 221; 1965 = 240; 1966 = 246; 1967 = 262; 1968 = 272; 1969 = 279; 1970 = 299; 1971 = 313; 1972 = 332; 1973 = 336; 1974 = 346; 1975 = 362; 1976 = 377; 1977 = 385; 1978 = 398; 1979 = 406; 1980 = 436; 1981 = 463; 1982 = 487; 1983 = 500; 1984 = 523; 1985 = 548; 1986 = 585; 1987 = 616; 1988 = 633; 1989 = 653; 1990 = 682; 1991 = 696. —, 1 wife; ----, 2 wives; - · - · -, 3 wives; · · · · ·, 2 or more wives; ———, 4 or more wives.

static between five and eight per cent. Marriages neither increase when times are good, not decrease significantly when times are bad. Indeed, during the past decade they even increased somewhat in the face of considerably reduced circumstances. Marriage for most Tonga men, in other words, is so desirable that it has withstood the centrifugal forces of the Periods of Stress and Decline.

The only significant changes over time are in polygyny. Figure 2 summarizes the proportions of monogamous and polygynous marriages by single year between 1956 and 1991 as well as the proportions of polygynous men with two, three, or four or more spouses. As we can see, the proportion of men with three or more spouses declined rapidly during the Period of Stress from 20 per cent in 1956 to 10 per cent in 1962 after

which they remained relatively stable, while the proportion of men with two wives remained relatively constant through the Period of Stress and the Period of Prosperity, only to decrease during the Period of Decline from almost 30 per cent in 1973 to less than 15 per cent by 1990. Overall the proportion of polygynous marriages fell from 50 per cent in 1956 to 20 per cent in 1991. This decline may be the result of the combined effects of increased education, urban migration, and general economic deterioration, compounded by the strong religious influence of various Christian missions all of whom discourage polygyny.

FERTILITY

Like nuptiality, fertility in the Gwembe is relatively high even by sub-Saharan African standards. Table 3 and Figure 3 compare total fertility and the age-specific fertility rates

Table 3. *Fertility in Africa and the Gwembe*

(Children per woman aged 15–49)

Time period	Botswana TF	Zimbabwe TF	Zambia TF	Gwembe	
				TF	TMF
65–69	—	8 ¹	7 ¹	6	10
70–74	6.5 ¹	—	7 ¹	6	10
75–79	7 ¹	7.1 ¹	9.8 ¹	6	10
80–84	6.5 ¹	6.4 ¹	—	6	9
85–88	4.9 ²	5.5 ²	—	6	9
89–92	—	—	6.5 ²	6	8
81	6.6 ³	—	—	7	10
83	6.4*, 5.9†	—	—	6	8
85	5.2 ³	6.5 ⁴	—	7	9
86	4.9 ³	—	6.7 ⁵	7	9
87	5.5 ³	—	—	7	10
89	5 ⁶	5.7 ⁶	—	6	9

* Botswana Family Health Survey (BFHS).

† Botswana Family Health Survey II (BFHS-II).

¹ George T. F. Acsadi, Gwendolyn Johnson-Acsadi and Rodolfo A. Bulatao, *op. cit.* in note * to Table 2.

² Barney Cohen (1993). 'Fertility, differentials, and trends' in National Research Council, *op. cit.* in fn. 23.

³ Naomi Rutenberg and Ian Diamond, 'Fertility in Botswana: the recent decline and future prospects', *Demography*, 30 (2), (May 1993).

⁴ John Bongaarts and Odile Frank, 'Biological and behavioral determinants of exceptional fertility levels in Africa and West Asia', in *African Population Conference* (Dakar: IUSSP, 1988).

⁵ Etienne, van de Walle, Patrick O. Ohadike and Mpembele D. Sala-Diakanda (eds), *The State of African Demography* (IUSSP, 1988).

⁶ Etienne van de Walle and Andrew D. Foster (1990). *Fertility Decline in Africa, Assessment and Prospects*. World Bank Technical Paper Number 125, Africa Technical Department Series (Washington D.C.: The World Bank).

in the Gwembe with the population of Zambia as a whole, and with two closely neighbouring nations, Botswana and Zimbabwe. Again the Gwembe leads the group. By 1980, Gwembe fertility, which was originally lower than that in neighbouring populations, exceeded that of both Botswana and Zimbabwe. As may be seen in Figure 3, this was true for virtually every age group from ages 20–24 to ages 35–39. As a consequence, fertility is moderately high today, with a total fertility (TF, the number of children a woman would have if she experienced the age specific rates of each age group at a specific time), of around six.

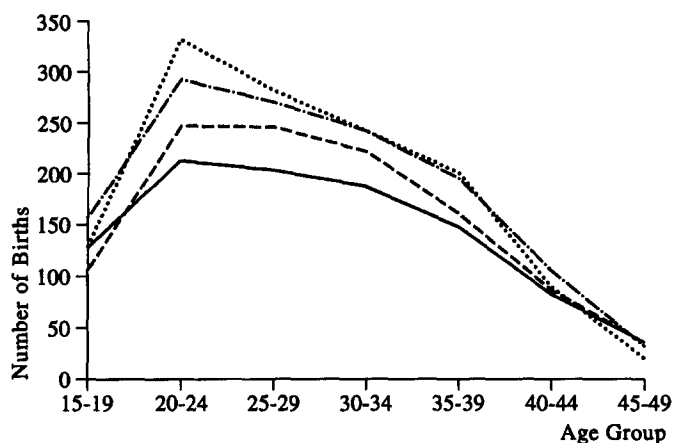


Figure 3. Age-specific fertility in Africa and the Gwembe in the 1980s. Births per 1000 married woman-years. Woman-years at risk by age group: 15-19 = 2070; 20-24 = 1610; 25-29 = 1422; 30-34 = 1173; 35-39 = 1,096; 40-44 = 985; 45-49 = 810. —, Botswana (Cohen, 1993); ---, Zimbabwe (Cohen, 1993); - - - - -, Zambia (Cohen, 1993); ·····, Gwembe.

But while nuptiality, represented by men's first marriage rates, was relatively static, marital fertility in the Gwembe actually shifted sharply over time in response to socio-economic trends. Figure 4 summarizes total marital fertility (TMF), the total fertility for

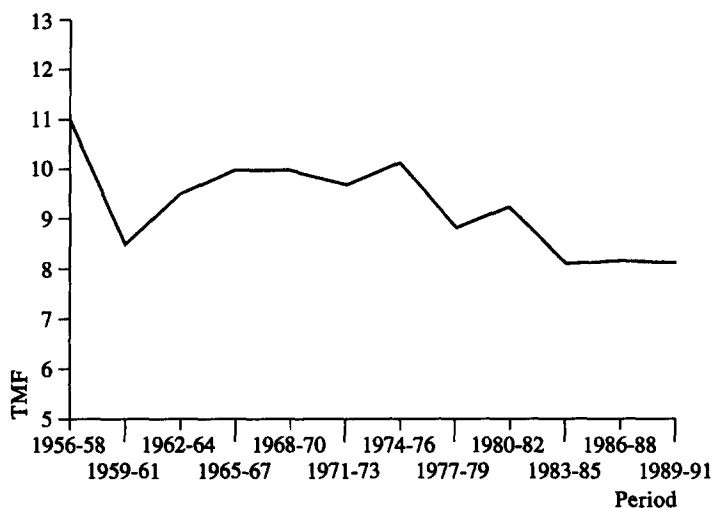


Figure 4. Total marital fertility in the Gwembe (TMF). Woman-years at risk by period: 1956-58 = 703; 1959-61 = 796; 1962-64 = 941; 1965-67 = 1076; 1968-70 = 1,202; 1971-73 = 1,363; 1974-76 = 1,467; 1977-79 = 1,562; 1980-82 = 1,782; 1983-85 = 1,967; 1986-88 = 2,274; 1989-91 = 2,559.

married women, by three-year periods from 1956 to 1991. Evidently, marital fertility declined during the Period of Stress by one-quarter from 11 children in 1956-68 to 8.5 in 1959-61; rebounded to 9.5 in 1962-64 with the onset of the Period of Prosperity; only to drop again by one-fifth during the Period of Decline, from 10 in 1974-76 to 8 by 1983-85.²⁶ Marital fertility, in other words, responded to good and bad times in opposite ways. Figure 5 depicts age-specific marital fertility by three-year periods from 1956 to

²⁶ These rates are neither affected by changes in women's age at first marriage which remained constant at 16.5 years from 1956 to 1991, nor by changes in the proportion of married women which was also relatively stable.

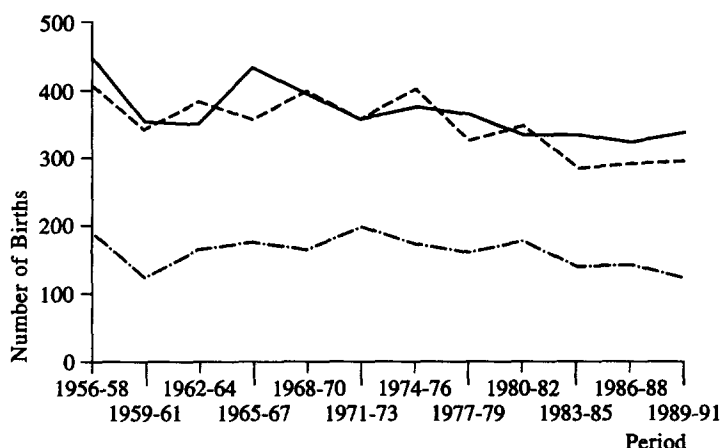


Figure 5. Age-specific marital fertility in the Gwembe. Births per 1000 married woman-years. Married woman-years at risk by period by age group (15-24, 25-34, 35-49): 1956-58 = 310, 247, 146; 1959-61 = 334, 289, 173; 1962-64 = 379, 338, 224; 1965-67 = 399, 398, 279; 1968-70 = 410, 454, 338; 1971-73 = 490, 472, 401; 1974-76 = 502, 493, 472; 1977-79 = 499, 502, 561; 1980-82 = 598, 592, 292; 1983-85 = 644, 673, 650; 1986-88 = 839, 737, 698; 1989-91 = 955, 879, 726. —, 15-24; ---, 25-34; -.-.-, 35-49.

1991. It is clear that the recent decline in fertility is common to all age groups and therefore cannot be attributed to higher secondary education or to new methods of contraception, which are confined to comparatively recent years and to younger women.²⁷

At the moment, we can only say that this decline in fertility may be a product of economic circumstances. Figure 6 summarizes marital fertility by village of origin from 1956 to 1991 by three-year periods. We can see that fertility rose during the Period of Prosperity when conditions were best, and fell during the Periods of Stress and Decline when conditions were worse. Moreover, in Mazulu and Siameja, the two most volatile villages, the largest, if temporary, increase in marital fertility during the Period of Prosperity and the most pronounced decline in marital fertility were found during the Period of Decline.²⁸ Thus while TMF during this period barely declined from 11 to 10 in Sinafala and from 10 to 9 in Musulumba, it fell radically from 12 to 8 in Mazulu, and from 11 to 6 in Siameja. We have not been able to identify any form of stopping behaviour in Mazulu or Siameja to account for such dramatic declines in fertility.²⁹ We speculate, therefore, that fertility declines may be more the product of changing spacing practices.

In any case, this overall drop in marital fertility from 11 in 1956-58 to 8 in 1983-85 is one of the most significant changes in Gwembe demographic behaviour during the 36

²⁷ Younger married women have only very recently reported a reliance on contraception, primarily as a spacing technique. During Colson's last visit, several women expressed a strong preference for longer birth intervals (at least three years) and claimed to use new methods of contraception, such as the pill, to achieve this goal.

²⁸ Siameja and Mazulu have been the two poorer of the four villages since the early 1970s. Siameja was resettled on a restricted land base along the middle reaches of the Mwenda River where household access to arable soils is less than before relocation, or in comparison to other villages. Siameja supplements its inadequate harvests with purchased food financed by wage labour in the nearby gemstone mines. As a result, Siameja is characterized by a labour pattern in which villagers have been forced to rely more heavily on outside wage labour. Mazulu, unlike Siameja, was initially provided with favourable access to farmland. By the early 1970s, however, all available land was under cultivation. Moreover, landowners in the host population began to reclaim alluvial gardens loaned to Mazulu people at the time of resettlement. Increasing land pressure has forced entire homesteads to move out of the village. Musulumba and Sinafala, by contrast, are better-off. Musulumba has access to land for expansion to the south, while Sinafala benefits from its proximity to the productive edges and waters of the Kariba reservoir.

²⁹ Age at last birth, for example, does not change during this period.

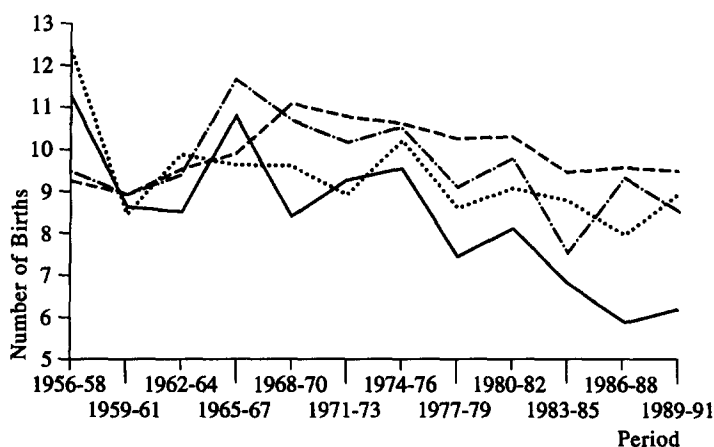


Figure 6. Total marital fertility by village in the Gwembe. Births per married woman. Married woman-years at risk by period by village (Siameja, Sinafala, Mazulu, Musulumba): 1956-58 = 216, 212, 96, 179; 1959-61 = 255, 245, 105, 181; 1962-64 = 281, 281, 155, 223; 1965-67 = 303, 317, 183, 269; 1968-70 = 338, 348, 227, 286; 1971-73 = 410, 375, 271, 304; 1974-76 = 458, 400, 300, 307; 1977-79 = 483, 440, 327, 311; 1980-82 = 560, 473, 393, 351; 1983-85 = 593, 543, 436, 389; 1986-88 = 668, 633, 531, 434; 1989-91 = 760, 696, 599, 486. —, Siameja; ----, Sinafala; - · - ·, Mazulu; · · · ·, Musulumba.

years studied. Other studies have detected only a slight decline in fertility in sub-Saharan Africa – a drop in TF in Botswana, for example, from 6 in 1979 to 5 in 1985.³⁰ In no study has a fertility decline as extreme, or one which extended over such a long time period been recorded.³¹ For this reason the ongoing Gwembe study provides a unique opportunity to document the fertility transition in rural-sub-Saharan Africa in its entirety. In addition, given the availability of other systematic individual data on education, residence, and wealth, we can look forward to testing a variety of causal explanations for the fertility decline.

MORTALITY

Mortality, like fertility, responded to changing conditions. This was especially true for the very young and the very old. Table 4 compares child mortality rates in the Gwembe

Table 4. *Child mortality in Africa and the Gwembe*

Area	Deaths during the first five years of life per thousand births								
	Pre-1960	1960	1965	1970	1975	1980	1985	1987-9	1990-2
Botswana*	—	175	160	140	120	90	60	—	—
Zimbabwe*	—	160	155	145	140	135	95	—	—
Zambia†	—	220	190	180	165	150	—	190	190
Gwembe‡	274	239	234	170	158	186	189	174	156

* Douglas C. Ewbank and James N. Gribble (1993), *Effects of Health Programs on Child Mortality in Sub-Saharan Africa* (Washington D.C.: National Academy Press), 14.

† K. Gaisie, A. R. Cross, and G. Nsamukila, *Zambia Demographic and Health Survey 1992* (Lusaka: University of Zambia and Central Statistical Office; Columbia, MD: Macro International, Inc.).

‡ The Gwembe figures are from 1956-58, 1959-61, 1964-66, 1969-71, 1974-75, 1979-81, 1984-86, 1987-89, 1990-92.

³⁰ See N. Rutenberg and I. Diamond, 'Fertility in Botswana: the recent decline and future prospects', *Demography*, 30.2 (1993), pp. 143-157.

³¹ See B. Cohen, 'Fertility levels, differentials, and trends', in National Research Council, *loc. cit.* in fn. 23, pp. 8-67; E. van de Walle and A. Foster, 'Fertility decline in Africa: assessment and prospects', *World Bank Technical Paper 125* (Washington, D.C.: The World Bank, 1990).

from 1960 to the present day with estimates for Zambia as a whole, and with two closely neighbouring nations, Botswana and Zimbabwe. As we might expect, the highest mortality rates, just like the highest nuptiality and fertility rates, are found in the Gwembe. Figure 7 summarizes the age-specific death rates in the Gwembe by three-year

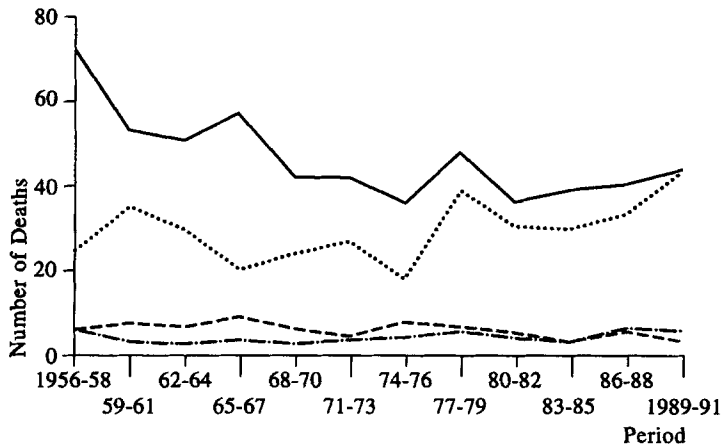


Figure 7. Age-specific mortality in the Gwembe. Deaths per 1000 person-years. Person-years at risk by period by age group (0-4, 5-14, 15-49, 50+): 1956-58 = 1,156, 1,420, 2001, 253; 1959-61 = 1,366, 1,591, 2,211, 290; 1962-64 = 1,582, 1,837, 2,523, 308; 1965-67 = 1,682, 2,133, 2,920, 361; 1968-70 = 1,830, 2,484, 3,234, 430; 1971-73 = 1,992, 2,793, 3,651, 502; 1974-76 = 2,132, 3,046, 4,092, 581; 1977-79 = 2,171, 3,358, 4,670, 681; 1980-82 = 2,243, 3,594, 5,214, 838; 1983-85 = 2,344, 3,569, 5,319, 892; 1986-88 = 2,617, 3,772, 5,975, 984; 1989-91 = 2,863, 3,624, 5,894, 1,041. —, 0-4; ---, 5-14; - · - · -, 15-49; · · · · ·, 50+.

periods beginning in 1956. Two patterns stand out. On the one hand, child mortality during the first five years of life, depicted in Table 4, decreases in all four populations,³² with annual death rates, depicted in Figure 7, falling in the Gwembe during the Period of Stress and the Period of Prosperity by roughly one-half, from 80 per thousand in 1956 to 40 per thousand in 1968.³³ On the other hand, mortality of the older population aged 50 or older in the Gwembe shifts largely in response to socio-economic trends with annual death rates rising and falling by over 50 per cent during the Periods of Stress and Prosperity, and finally doubling during the Period of Decline from 20 per thousand in 1974 to over 40 in 1991.

The decline in child mortality in the Gwembe during the so-called Period of Stress is surprising but can be attributed, as elsewhere in sub-Saharan Africa, to the spread of modern medicine.³⁴ Before relocation, only Mazulu and Sinafala were near a modern health facility, a two-nurse missionary clinic at Chabbo Boma, one and four miles distant respectively. Both Musulumba and Siameja were 12 miles distant from similarly sparse health facilities. None of the villages was within 50 miles of a hospital. This changed with relocation in 1958-59. The government established a new clinic near

³² See A. Hill, 'Trends in childhood mortality', in National Research Council, *loc. cit.* in fn. 23, pp. 153-217.

³³ The fluctuations in child mortality are mainly the result of measles epidemics in 1956, 1965, and 1978.

³⁴ See E. Ewbank and J. Gribble, *Effects of Health Programs on Child Mortality in Sub-Saharan Africa* (Washington D.C.: National Academy Press, 1993).

the newly relocated villages of Musulumba and Mazulu (one and three miles distant respectively) and transferred another clinic to the relocated village of Siameja. In both government clinics there were several nurses, including at least one midwife. In addition, several new hospitals were built within 20 miles of two of the villages and 40 miles from the other villages. As a result, child immunization programmes achieved greater coverage, and more women were able to receive ante-natal care and give birth under the supervision of a trained midwife. The government, furthermore, embarked on aggressive anti-mosquito and anti-tsetse fly spraying campaigns that reduced the insect populations in and around people's homes and eliminated tsetse flies from several areas. The incidence of malaria and of childhood diseases decreased dramatically until recently, with corresponding decreases in child mortality.³⁵

The recent increase in deaths among the elderly, conversely, can be attributed to the deterioration of such health-care facilities during the Period of Decline, as well as to the series of droughts since 1979, and the continued deterioration of the economy. When times are difficult and they can no longer contribute to the physical well-being of the community, the elderly are the first to be marginalized.³⁶ Food, medical attention, and other resources go first to younger adults, then to children, and finally to the elderly. The elderly, therefore, are most disadvantaged in bad times.³⁷ Much of the increase in the death rate of middle-aged adults in recent years, moreover, can be attributed to violence due to community unravelling and to the rapid spread of AIDS.³⁸ Mortality of adult males, for example, doubled from four per thousand in the early 1970s to eight per thousand in the early 1990s. In one of the four villages, no men died violently between 1956 and the mid-1970s. Since then, eleven of the 16 men between the ages of 20 and 40 who have died, died as a result of violence.³⁹ While the increase in mortality due to violence is hardly statistically significant, the rise of such social pathologies has had grave consequences on the social relations that tie Gwembe communities together.

SEX PATTERNS OF MORTALITY

In fact, at most ages men's death rates in the Gwembe are higher than those of women. Figure 8 compares the age-specific mortality rates in the Gwembe for the entire period under consideration by sex. Again this differential in mortality is especially great among

³⁵ Rhonda Gillette spent five months in the Gwembe in 1993 making anthropomorphic measurements for a follow-up study of Philip Tobias's anthropomorphic study of Tonga school children in 1956. When her results become available, they should shed more light on the improvements in child health as well as on the physical deprivation of the elderly.

³⁶ See E. Colson and T. Scudder, 'Old age in Gwembe district' in P. Amoss and S. Harrell (eds), *Other Ways of Growing Old: Anthropological Perspectives* (Stanford: Stanford University Press, 1981), pp. 124–153. Lisa Cliggett is currently in the Gwembe doing anthropological fieldwork on care of the elderly in the context of Tonga social organization. Her results, together with the survey research proposed by George Alter of Indiana University and Mubiana Macwan'gi of the University of Zambia, should shed light on the sources and expectations of old age support among the Tonga as well as elsewhere in Zambia.

³⁷ See E. Colson, 'In good years and in bad: food strategies of self-reliant societies', *Journal of Anthropological Research*, 85.1 (1979), pp. 18–29.

³⁸ Because we have not systematically recorded cause of death and because of the inherent difficulties in diagnosing AIDS, it is not possible at this time to determine the exact proportion of adults who died of AIDS. However, an alarming number of very recent deaths of adults are attributed locally to AIDS. This is not surprising given the high AIDS infection rate in urban areas of Zambia.

³⁹ Shilling (age 39) was assassinated in 1979 by Rhodesian terrorists; John (age 29) drowned while fishing and Philip (age 34) committed suicide in the same year; Tiki (age 22) was poisoned in 1980; Kenneth (age 27) was poisoned in 1981; Abraham (age 27) was poisoned in 1987; William (age 40) committed suicide after being caught stealing goats in 1987; Cecil (age 56) was killed by his son-in-law, in 1987 who, in turn, died at age 31 the same year (We suspect violence – maybe poison in revenge for the death of Cecil); Sikabwele (age 31) was murdered in 1991; and Aaron (age 33) was killed as a suspected poacher by Zimbabwean security forces in 1991. (All names are pseudonyms.)

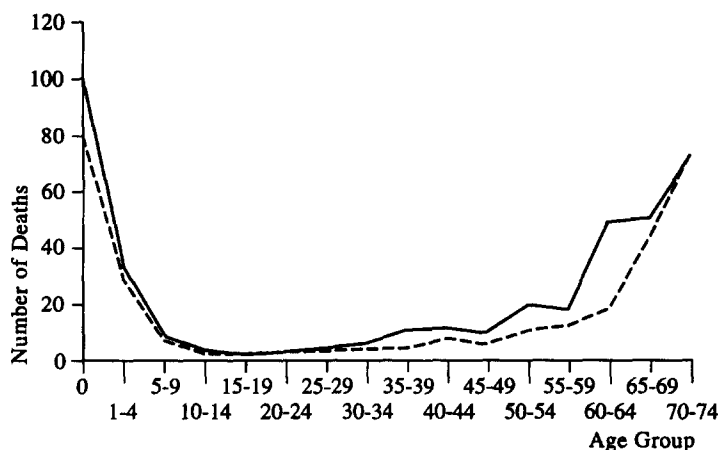


Figure 8. Age-specific mortality (m_x) by sex. Deaths per 1000 person-years. Person-years at risk by age group by sex (male, female): 0 = 2779, 2989; 1-4 = 8565, 9642; 5-9 = 8385, 9731; 10-14 = 6793, 8312; 15-19 = 5613, 7100; 20-24 = 4459, 5659; 25-29 = 3502, 4301; 30-34 = 2540, 3362; 35-39 = 1916, 2688; 40-44 = 1475, 2149; 45-49 = 1178, 1768; 50-54 = 911, 1435; 55-59 = 682, 1087; 60-64 = 477, 787; 65-69 = 299, 504; 70-74 = 182, 288.

young and elderly males who, as we shall see, die at *twice* the rate of females of the same age. Even young and middle-aged males die at higher rates than their female counterparts. Only between the ages of 15 and 24 are death rates of males and females similar. Such sex-selective mortality is typical of sub-Saharan Africa in general, although better documented in the Gwembe.⁴⁰

Such differential sex-selective mortality among the very young and the very old suggests a high degree of sex preference in the Gwembe. This is consistent with a cultural bias, typical of matrilineal societies in sub-Saharan Africa, that favours females over males.⁴¹ Gwembe women must have daughters to perpetuate their *basimukoa*, or matrilineage. When a daughter is born, women customarily give two cries of joy as opposed to one for the birth of a boy. Women who have given birth to a disproportionate number of boys have told Colson that they are criticized by their kin for their failure to provide for the continuity of their matrilineage. Men also prefer daughters whose marriages will bring them wealth in the form of marriage payments. The birth of a girl, unlike that of a boy, is called *lubono*, or wealth.⁴² Boys, on the other hand, given the decline in the real value of wages, increasingly rely on their fathers and other kin for daily support, and to finance their marriages. A man with a large number of sons and few or no daughters sees himself as disadvantaged. A preference for daughters is a fact of Gwembe life. Sex-selective preferences elsewhere (East Asia, South Asia and

⁴⁰ See H. Harpending and R. Pennington, 'Age structure and sex-biased mortality among Ovaherero pastoralists', *Human Biology*, 63 (1991), pp. 327-357; P. Ohadike, 'Evolving indications of mortality differentials by sex in Africa', in A. Lopez and L. Ruzicka (eds), *Sex Differentials in Mortality* (Canberra: Australian National University, Department of Demography), pp. 33-52; I. Timaeus, 'Adult mortality', in National Research Council, *loc. cit.* in fn. 23, pp. 218-255.

⁴¹ See L. Cronk, 'Preferential parental investment in daughters over sons', *Human Nature*, 1 (4) (1991), pp. 387-417; J. Whiting, 'The effect of polygyny on sex ratio at birth', *American Anthropologist*, 95 (2) (1993), pp. 435-442.

⁴² In the mid-1950s, few households earned more than US \$20.00 a year, and marriage payments then were about US \$40.00. Since 1956, the number of marriage payments and the amount of cash demanded by custodians of marriageable girls have steadily increased. Girls therefore continue to represent wealth.

Europe)⁴³ are associated with an unbalanced sex ratio among infants, due at least in part to infanticide or neglect. It would not be surprising, therefore, for the Gwembe preference for girls to be reflected in child mortality rates.

The comparative sex-specific mortality of single births and same-sex and different-sex twins, summarized in Table 5, confirms parental indifference toward boys. So far we do not know whether this differential mortality continues in the present. It is well known that in the past twins were considered *malweza* or 'evil omens' and one was usually killed at birth. Villagers reported that the male used to be killed in the case of different-sex twins, and the last-born in the case of same-sex twins.⁴⁴ We would, therefore, expect mortality to be lowest among single female infants and highest among male twins. Infant death rates in Table 5 reflect this preference scheme. During the first year of life, the

Table 5. *Infant mortality of twins in the Gwembe*

Type of birth	Infants at risk	Deaths per thousand ± standard deviation
Female singleton	3,122	85 ± 17
Female different sex twin	31	320 ± 152
Female same sex twin	60	300 ± 108
Male singleton	2,882	104 ± 18
Male different sex twin	35	370 ± 134
Male same sex twin	38	550 ± 108

mortality of female singletons is only 85 per thousand, compared with 104 for males. Twins' rates are 300 per thousand,⁴⁵ compared with 550 per thousand for male same-sex twins. Male same-sex twins, in other words, die during infancy at *five* times the rate of non-twins and almost *twice* the rate of other twins.⁴⁶

The Tonga, in other words, may be willing to terminate the lives of unwanted children, and especially unwanted males, although they do not publicize this fact. Most deaths probably occur during the first days of life when a mother and her newborn child are secluded with only the midwife and attending female relatives for company. Colson on several occasions observed women in the days immediately after childbirth neglecting a male twin to nurture the female, only to learn later of the boy's death.

Given such observed behaviour, it is not surprising that the sex ratio of recorded births in the Gwembe population is skewed. Between 1956 and 1991, villagers reported

⁴³ See the papers presented at the recent IUSSP Conference on Abortion, Infanticide and Neglect in Asia, Past and Present. Kyoto, October, 1994.

⁴⁴ In January 1962, for instance, a group of women alleged that a woman who had fraternal twins, 'killed the boy [then some months old] because his children would not belong to her *basimakoa*,' that is to her matrilineage.

⁴⁵ According to G. Guo and L. Grummer-Strawn, 'Child mortality among twins in less developed countries' *Population Studies*, 47 (3) (November, 1993), pp. 495–510, mortality for twins in less developed countries is many times higher than that for twins in developed countries. Thus, while the probability of dying during the first year of life was 48 per thousand for white twins in the United States in 1983, it was 292 per thousand in Mexico, the median level of twin mortality in all World Fertility Survey countries. The overall higher twin mortality in the Gwembe may not therefore be intentional.

⁴⁶ In all societies, the perinatal and neonatal mortality rates of twins are higher than the mortality rates of singletons, due to lower twin birth weights (S. Taffel, 'Health and demographic characteristics of twin births in the United States, 1950–1988', *Vital Health Statistics*, 50 (June, 1992), pp. 1–17). There is also some evidence that the mortality of same-sex twins is slightly higher than the mortality of different-sex twins (H. Rydhstrom, 'The effects of maternal age, parity, and sex of twins on twin perinatal mortality: a population based study', *Acta Geneticae Medicae et Gemellologiae*, 39 (3) (1990), pp. 401–408). Nevertheless, the differences between the mortality of male same-sex twins and other twins are far greater in the Gwembe than in other societies.

a total of 5,058 births – 2,429 boys and 2,629 girls, that is only 92 boys for every 100 girls.⁴⁷ This considerable divergence from the natural human sex ratio at birth of 102 boys for every 100 girls⁴⁸ means that the births of over 250 boys were not reported, that is one-tenth of all births of males. In Figure 9 we calculate the number of unreported

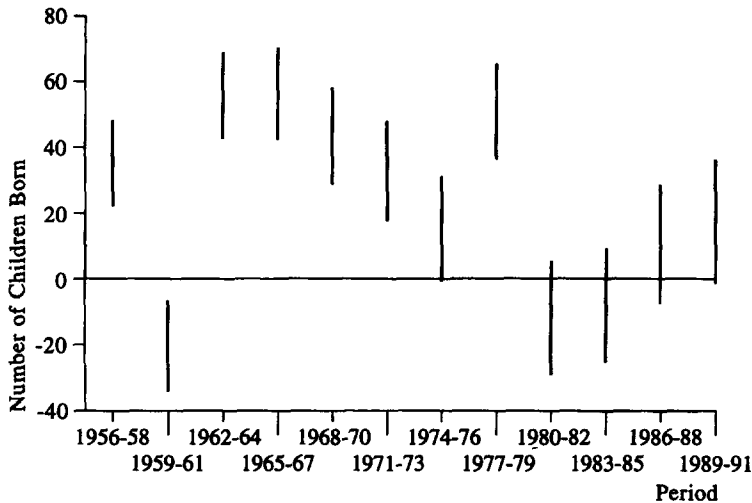


Figure 9. 270 missing Tonga boys. $((\text{Girls born} \times 1.02) - (\text{Boys born})) \pm \text{standard deviation}$. Male and female infants: 1956–58 = 158, 189; 1959–61 = 175, 151; 1962–64 = 160, 211; 1965–67 = 182, 233; 1968–70 = 208, 246; 1971–73 = 218, 245; 1974–76 = 240, 250; 1977–79 = 209, 245; 1980–82 = 280, 262; 1983–85 = 279, 265; 1986–88 = 318, 321; 1989–91 = 352, 362. —, Males; ---, females.

boys for each three-year period between 1956 and 1991. The vast majority occurred during the Period of Prosperity between 1963 and 1973. Villagers did not report all births of boys even during periods of expatriate fieldwork – 1956–57; 1962–63; 1972–73; 1987–8 – or during such recent times as 1989–1991, when the survey data are most accurate and complete. Furthermore, a significant proportion of these missing boys were apparently male same-sex twins. Table 5 reports 60 same-sex female twins, but only 38 same-sex male twins, a shortfall, given the natural sex ratio at birth, of 24 boys. Male same-sex twins, in other words, make up eight per cent of the missing children, that is *ten* times their normal proportion in human populations.⁴⁹ The implication is an infant death rate for male same-sex twins of over 700 per thousand, that is well over twice the mortality rate of other twins.

Presumably these missing boys were simply never reported, either because they died very early in childhood and were forgotten,⁵⁰ or because they were victims of infanticide or conscious neglect and were deliberately not reported. Colson and Scudder do not

⁴⁷ Mazulu and Sinafala, the villages for which we have the most complete coverage and the villages where all expatriate field workers resided, also report the most lopsided sex ratio, 1,237 sons to 1,398 daughters, that is only 88 boys for every 100 girls.

⁴⁸ See P. Visaria, 'Sex ratio at birth in territories with relatively complete registration', *Eugenics Quarterly*, 14 (2) (1967), pp. 134–135. We would like to thank Samuel Preston and Althea Hill for their advice on the sex ratio of black populations.

⁴⁹ According to H. Shryock, J. Siegel *et al.*, *The Methods and Materials of Demography* (Washington D.C.: U.S. Department of Commerce, 1971), p. 480, twins account for between one-half and one per cent of all live births.

⁵⁰ Some of these missing boys may be a product of misreported sex, especially if they had died. However, since the recorded rates of infant and child mortality for males are higher than those for females, this is unlikely to have been very common. In any case, the implication would be the same: much higher male infant and child mortality among males than among females.

believe that it is possible for this number of boys to have survived the immediate birth period undetected, especially during the years when expatriate researchers were resident in the villages. Even if they had, they would have been registered during a later visit. We, therefore, assume that all of the missing boys were either not born alive, or must have died in early infancy. In the latter case, we cannot determine what proportion were victims of neglect and what proportion victims of infanticide. Figure 10 estimates

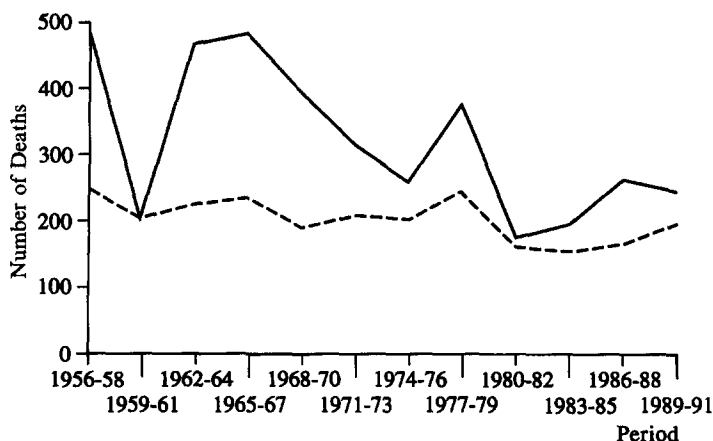


Figure 10. Estimated male child mortality ($_{10}q_0$) in the Gwembe. Deaths during the first ten years of life per 1000 births. Person-years at risk by period by sex (males, females): 1956-58 = 868, 1,109; 1959-61 = 1,039, 1,196; 1962-64 = 1,196, 1,391; 1965-67 = 1,344, 1,638; 1968-70 = 1,411, 1,797; 1971-73 = 1,539, 1,972; 1974-76 = 1,744, 2,030; 1977-79 = 1,886, 2,114; 1980-82 = 2,019, 2,176; 1983-85 = 2,054, 2,138; 1986-88 = 2,249, 2,336; 1989-91 = 2,380, 2,465. —, Males; ----, females.

mortality of boys by distributing the deaths of the missing boys between ages 0 and 9 according to the observed schedule of mortality of males for that age group in the Gwembe. The results show that during childhood, the death rate for boys was sometimes *twice* that for girls. Ironically, this difference was particularly large during the Period of Prosperity.⁵¹ Evidently just as many parents sought to control their fertility in bad times, they also tried to regulate their family composition in good times. When they could afford to, they chose daughters in preference to sons.

IMPLICATIONS

The demographic rates described above have several important implications for our understanding of Gwembe society during the last four decades. First, while nuptiality was generally unresponsive to socio-economic change, fertility and mortality were sensitive to 'stress' and 'decline' as well as to 'prosperity'. Just as Colson and Scudder had suggested, the wrenching process of involuntary resettlement provoked sharp demographic responses, with dramatic decreases in fertility and increases in old-age mortality. Moreover, while the rising level of income and government services in the 1960s reversed these trends, with a decline in old-age mortality and a startling rebound in fertility, worsening conditions during the 1970s and 1980s saw fertility fall once again and mortality rise sharply among the young and especially the old.

⁵¹ By definition these unrecorded births mean that fertility in the Gwembe was underestimated by at least five per cent. The temporal pattern of missing boys in Figure 9, however, suggests that the overall contours of marital fertility, depicted in Figure 4, would be largely unchanged. The fertility increase during the Period of Prosperity, however, would be greater than depicted.

Secondly, both the rise in old-age mortality during the Period of Decline and the startling fall in child mortality during the Period of Stress testify to the overriding importance of local health-care facilities. For two decades, immunization and aggressive public health measures virtually eradicated a wide variety of epidemic diseases in the Gwembe. The recent deterioration of health-care facilities and the consequent spread of tuberculosis among the elderly, and measles among children, however, draw attention to the need for better public health care. The Gwembe, like most of sub-Saharan Africa, has yet to complete the epidemiological transition. Moreover, the rise of AIDS in Zambia including the Gwembe will require extensive public education as well as expensive hospital treatment. In this regard, at least, government intervention is vital.

Thirdly, the evidence for higher mortality of males both among the very young and the very old indicates an unusual demographic bias. Previous scholars have devoted much attention to the prevalence of excessive mortality of females in patrilineal societies, and in particular to the widespread practice of female infanticide and neglect of girls in Asia.⁵² Recent research has suggested that such behaviour may also have existed in the West, especially in the Mediterranean countries.⁵³ The Gwembe data suggest that similar prejudices and customs may be characteristic of matrilineal societies, but against males, not females. Our demographic analysis may, therefore, reveal important cultural values which extend beyond the Gwembe, and which have been hitherto largely ignored.

Future research will have to determine the mechanism that underlies higher infant and child mortality of boys. Lee Cronk in an important study of another matrilineal society, the Mukogodo in Kenya, discovered that parents were 50 per cent more likely to take their daughters to a health worker.⁵⁴ Clinic records from the relevant Gwembe health centres may reveal whether similar behaviour was common in the Gwembe both for the elderly as well as for children. Explanations for the continuing drop in Gwembe fertility must also await further fieldwork and the analysis of existing data on educational levels, changing religious affiliations, and increased access to contraceptive services.

Clearly, the Tonga have altered their demographic behaviour significantly in response to the tumultuous changes that have afflicted the Gwembe and Zambia since 1956. The wealth of information accumulated through the Gwembe Study provides a unique opportunity for continued investigation into the demographic consequences of socio-economic changes in the Gwembe as well as important background information for a wide variety of non-demographic studies. To the extent that our results reflect the broad experiences of other African populations, the Gwembe Study will continue to contribute to our knowledge of African demography, and sub-Saharan African society in general.

⁵² See J. Lee, C. Campbell, and G. Tan, 'Infanticide and family planning in late imperial China: the price and population history of rural Liaoning, 1774-1873', in L. Li and T. Rawski (eds), *Chinese History in Economic Perspective* (Berkeley: University of California Press, 1992), pp. 145-176; J. Lee, F. Wang, and C. Campbell, 'Infant and child mortality among the late imperial Chinese nobility: implications for two kinds of positive check', *Population Studies*, 48 (3) (1994), pp. 395-412.

⁵³ D. Kertzer, *Sacrificed for Honor: Italian Infant Abandonment and the Politics of Reproductive Control* (Boston: Beacon Press, 1993).

⁵⁴ See L. Cronk, 'Preferential parental investment in daughters over sons', *Human Nature*, 1 (4) (1991), pp. 387-417.