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Settlement and Mortality of the Christian Site (1050 A.D.–1300 A.D.) of Meinarti (Sudan)

Demographic analysis of cemetery data can be a useful complement to archaeological studies. Skeletal remains, when they comprise a representative sample, can serve to define certain relationships between the cultural and biological aspects of human adaptation. Furthermore, differential mortuary practices often mirror the status system of a society.

Specifically, this paper examines the status system and mortality pattern of the community of Meinarti in the Sudan. Stationary life table analysis shows age, sex, and an additional factor (reflected in survival) as determinants of status. In addition, the analysis of mortality supports Adam's hypothesis of village growth and decline.

1. Introduction

The reconstruction of a prehistoric social system often necessitates extensive analysis of fragmentary materials. In order to overcome this shortcoming, archaeologists have utilized methods derived from such disciplines as: geology (Vita Finzi, 1963), botany (Helbaek, 1963), demography (Birdsell, 1957), ecology (Hole, Flannery & Neely, 1969), and geography (Longacre & Reid, 1972), to aid and supplement their analysis. In addition, a variety of approaches have been utilized to increase the quantity and quality of information extracted from the excavation. One such approach, settlement archaeology, employs the concept of community in its analysis of the artifact in time and space. This concept can be complemented and enhanced by the population analysis of the physical anthropologist. At sites where sufficient skeletal remains exist, paleodemographic analysis integrates information concerning the settlement patterns with population structure, thus providing additional insights into the social system of the group.

The settlement approach arranges the data so as to reflect the behavior of the social group. Research, therefore, not only stresses the information obtained about the artifact, but also emphasizes the spatial and temporal dimensions which define the social activities that produced it. The boundaries delimiting these social activities have been defined as the community (Chang, 1965:3). The archaeologist, lacking any observable activity, must rely on the remains of these activities, i.e. the archaeological settlement, in delimiting the community. The settlement approach, by focusing on the material remains, thereby defines the limits of the prehistoric population.

To further the scope of the community approach, skeletal remains, when they comprise a representative sample, can serve to define various relationships between the cultural and biological aspects of human adaptation. The cemetery provides information used in both estimating the vital statistics of the population and in defining its parameters. Data from a Christian site (1050 A.D.–1300 A.D.) on the island of Meinarti in Sudanese Nubia (Figure 1) will be used to discuss the relationship of the settlement pattern to the demographic structure of the group.

2. The Analysis of Mortality Data

The basis for paleodemographic analysis is the sex and age at death of skeletal remains. The data may be subjected to various methods of analysis. Two methods have had

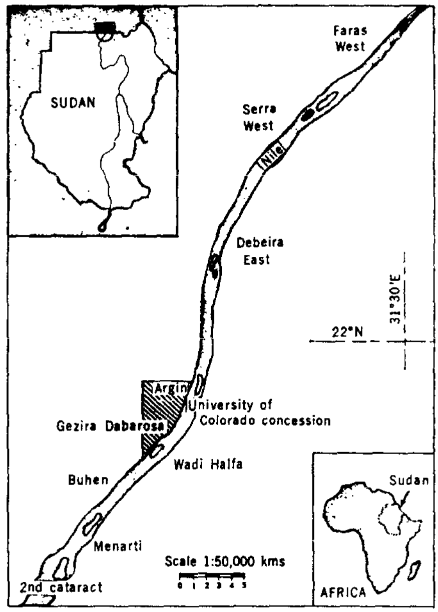


Figure 1. Map of Nubia noting the location of the site of Meinarti.

widespread use. The first compares the percentages and proportions of age groups (infants, children) of the population under study (Angel, 1969). The second method, survival curve analysis (Blakely, 1971), depicts the cumulative percentage of survivors at the end of arbitrarily selected age intervals and thus visually presents the mortality trends of the population. The curve is charted by assuming an initial population of 100% with each point subsequently derived by subtracting the percentage of deaths during the successive age intervals. One problem in utilizing survival curves stems from their cumulative nature since the first values directly affect the latter ones. If, for example, the initial values of two populations differ greatly, this difference will be reflected throughout the graph. Relative changes of mortality, reflected by the slope of the lines, therefore, remain the only means of graphic comparison.

In an effort to find a more effective method of analysis and comparison, anthropological demographers have recently revived the use of the life table (Swedlund & Armelagos, 1969; Acsadi & Nemeskeri, 1970). These tables consist of a series of population attributes calculated from the mortality data. In addition to survivorship, life expectancy (e_x) and the probability of dying at age x (q_x) can also be calculated in the life table. The latter two are not cumulative and are, therefore, useful in comparative analysis. The life table reflects the fluctuating nature of mortality with respect to age and highlights critical age intervals for mortality in a population (Swedlund & Armelagos, 1969). In other words, age specific differences in mortality enhance inter- and intrapopulational comparisons.

The specific type of life table proposed for paleodemographic analysis is the composite life table. Devised by field ecologists, it is based on the age of animals at death regardless of the exact year of their birth or death (see Deevey, 1947; Quick, 1963). Thus the composite life table treats a cross-sectional sample of the population (more than one cohort at a single point in time) as a representative sample of that population through time. The limitations of this method of sampling are that it assumes (1) a constant probability of dying with respect to age through time, and (2) the absence of migrations during the time period under study. Although no human population is constant through time, prehistoric populations are generally assumed more stable than modern populations in terms of mortality because of their lack of rapid nutritional and medical improvements. Migrations must be investigated archeologically and, if possible, historically, for each specific case (Swedlund & Armelagos, 1969).

Once the applicability of the life table is established, a further methodological problem involves the cemetery as a random or representative sample of the population under study. Criticism concerning this assumption has centered on the representation of infants and children in cemetery populations. It has been argued that differential burial practices and differential preservation serve to underrepresent infants and children making it inapplicable for life table analysis.

Regarding the first point, the critics note that in many societies infants and children are not formally buried with adult members in a cemetery but are, rather, discarded more casually. Secondly, it has been argued that infant's and children's bones decompose more rapidly than adult's bones and are thus less likely to be found in cemeteries. While the first observation is substantiated by ethnographic fact, it should not be taken as given. Since the mortuary practices of a society are regulated by its religious ideology, knowledge of this ideology can be used to predict the burial practices for the different segments of the population.

Returning to the second point, we do not find it verified archaeologically. If conditions are sufficient for the preservation of adult burials, complete and careful excavation of infant burials should recover at least some remains (i.e. dentition). Underestimates of the number of children deriving from differential preservation can, therefore, be attributed to a failure to completely excavate a cemetery for fragmentary remains.

Even accepting these limitations, life table analysis can be used to resolve the problems of an underrepresentation of children. The non-cumulative nature of the life table functions e_x (life expectancy at age x), and q_x (the probability of dying at age x), permits the truncation of the possibly distorted infant mortality statistics and, therefore, allows the paledemographer to make statements about the remaining segment of the population. In such a manner, mortality analysis of the adult portion of a population can be done without the influence of possibly biased infant statistics.

3. Nubian History

Nubia, a region located in the Middle Nile Valley, includes the area between the first to the fourth cataract. It extends from Egypt to the North into the Sudan in the South. Traditionally, interest has centered on Nubia's role as a corridor between the distinct cultural centers of sub-Saharan Africa and Egypt. Much research has, therefore, been concentrated on studying its historical, cultural and biological changes.

Ecologically, Nubia's history has been constantly affected by rainfall, the level of the Nile, and sand accumulation. Throughout the time period under study (1050 A.D.–1300 A.D.), the geologic studies of stratigraphic remains have suggested the absence of any major deluges of rain. This, however, did not eliminate the river's unpredictable annual fluctuations which produced its share of crop failures and flooding. During the Christian period (1050 A.D.–1300 A.D.) Meinarti was also overcome by one of the three advances and accumulations of sand which occurred during the island's history.

Historically, the mid-sixth century dates the conversion of Lower Nubia to Christianity

(Adams, 1967:7). Initially controlled by Egypt, the church later rose up to become the focus of Nubian independence (Adams, 1968). By classic Christian times (850 A.D.–1150 A.D.) Nubian influence had spread into upper Egypt, but by the late Christian period (1150 A.D.–1300 A.D.) the Nubian populations were confined to fortified centers. In addition, populations during the late Christian period were involved in increased warfare and continued harassment by nomads from the northern and southern Sahara, culminating in the disintegration of the Nubian church. Accumulation of sand and the flooding of the Nile contributed to the eventual abandonment of Lower Nubia during the fifteenth century.

The island of Meinarti is situated in the second cataract of the River Nile, while the site, which has remained stationary through its occupation, is located on the southern half of the one kilometer by one-half kilometer island. As an island, community activities were delimited by its physical boundaries. Basic activities were divided into farming, on the alluvium surrounding the village, and social and domestic activities within the village. Excavations have yielded 10 m of stratified deposits which reveal occupation, sand accumulation and flooding.

Excavation and analysis undertaken by W. Y. Adams (1964, 1965, 1967) show continuous occupation beginning around 200 A.D. and continuing until 1300 A.D. The strata have been divided into 18 occupation layers of which six represent large scale rebuilding and remodeling of the village. This paper will be limited to the macrostarta 9–7 (1050 A.D.–1150 A.D.) and 6–4 (1150 A.D.–1300 A.D.).

According to Adams (1968) at the beginning of the Christian period (levels 9–8: 1050 A.D.–1100 A.D.) the village appeared abandoned, then rebuilt within a few years. The patterns of settlement reminescent of a previous state transmit a feeling of safety from the flood danger which plagued the preceeding period. Spaciousness, a characteristic of the settlement, was conveyed through a large open plaza and large rooms. Communal activity is suggested by the planned construction of the village and its complexity. In addition, the church was restored to a plan which had originated in the preceding period. Levels 9–8 seem to indicate a time of cultural growth and security at Meinarti (Adams 1968).

Throughout the next level (level 7:1100 A.D.–1150 A.D.) sand was drifting and accumulating against the buildings. Village construction appeared to respond to this stress with buttresses, walls and blocked doors to combat the sand. Before final abandonment of the village the houses were bricked suggesting plans to return. Within a few years, sand had completely covered the village.

Meinarti was again reoccupied around 1150 A.D. (level 6). The village now contained two separate areas, the village proper and what has now been determined to be a granary (Adams, 1967). Built on top of the roofs of the previous level's houses, the new heavily walled separate unit structures represent an "expression of rebellion against previous times and perhaps a symptom of decay of the central polity" (Adams 1968:190). During this period, the village was again abandoned leaving material goods intact. Upon reoccupation, new houses with walls and brick vaulted roofs were again built on the old houses. A lookout tower was erected within the area of the granary. These trends in construction substantiate the historical evidence that Meinarti was frequently under the stress of enemy attack.

A cemetery located adjacent to the church was used continuously from A.D. 1050 until A.D. 1350 (levels 9–4). The cemetery was expanded vertically since accumulating sand continually covered burials thereby providing new surfaces for interment. The periodic whitewashing of the church and its subsequent splatter along the ground provide the means to stratigraphically correlate the cemetery levels with those of the village. This relationship provided the key to linking the burial populations with their appropriate communities. Within the cemetery, burials are differentiated by the appearance of superstructures (mudbrick structures 2 m × 1 m × 60 cm) which are found on top of a portion of the graves.

4. Analysis of Meinarti Mortality Data

The complete excavation of all levels of the Meinarti cemetery provides the essential mortality data for analysis. The data include the age and sex of each burial, its provenience (stratigraphic level) and the presence or absence of an accompanying superstructure.

The superstructures atop a portion of the burials of levels 9–7 form the focus of several problems. The first problem concerns the status system of the village of Meinarti as reflected by differential mortuary practices. In regard to this problem, the following hypotheses were tested:

(1) Age was a factor determining an individual's status.
(2) Sex was a factor determining an individual's status.
(3) The mortality patterns of the groups with and without superstructure reflect biological differences in terms of survival and thus suggest a third status factor.

The assumption underlying these hypotheses is that differential mortuary practices mark the status of the buried individual. This assumption is supported by several observations. Firstly, the building of a superstructure requires time, labor and materials. The fact that not all burials are accompanied by superstructures indicates that this effort was extended to a limited number of individuals. Secondly, archaeological and ethnographic evidence suggests that mortuary practices mirror the operating status system (see Brown, 1971). Examples of this archaeologically are most often found in the appearance of grave goods accompanying certain burials. In Christian Meinarti, however, individuals did not bury any material goods with the dead. Evidence of status differentiation, however, can be determined from an alternate source. As Nubia was under the influence of the Coptic Church, an examination of the rituals governing the church proved useful. A group of rituals were found involving the burial of the dead. On these occasions, a certain passage was read depending on the age and sex of the individual involved (Meinardus, 1970:64). These passages can be taken as indications of age and sex status differentiation.

The first hypothesis tested concerned age at death and the form of burial. If age was a status factor and a determinant of the form of burial, we should expect to find an association between age at death and burial with superstructure. To test this hypothesis, the sample was divided into subadults (ages 0–20) and adults (ages 21–55) and a chi square test for association administered (see Table 1). The results of this test indicated a significant association between adults and superstructure ($\alpha = 0{\cdot}001$). Further analysis suggests that the frequency of superstructures increased with the age of the individual (Figure 2, Table 2). Age, therefore, was a factor determining burial with superstructure.

Next, the association of sex of the individual and burial with superstructure was tested (see Table 3). The results of the chi square test reveal a significant association between male burials and superstructure ($\alpha = 0{\cdot}001$). The possibility, however, exists that the

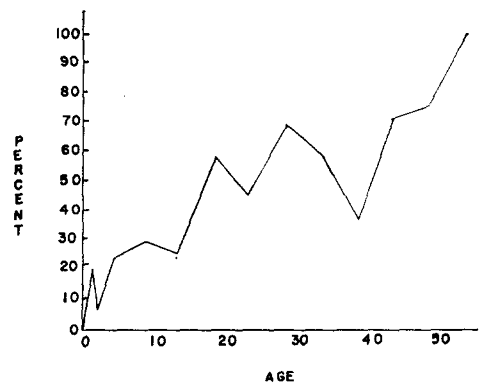
Table 1 **Chi square for association of age of individual and occurrence of superstructures at Meinarti from levels 9–7 (1050A.D.–1150A.D.)**

Provenience-age	Burials with superstructures	Burials without superstructures	Total
Levels 9–7 (1050A.D.–1150A.D.)			
Adults (over 20 years)	81	73	154
Pre-adults (under 20 years)	24	77	101
Total	105	150	255
Chi square (1 d.f.) = 2·0938*			

* Significant at greater than 0·001 level of confidence.

association of superstructure with sex is an artifact of the previously discovered association between age and burial with superstructure. In other words, if the sample of those individuals buried with superstructure contains proportionately more older males or younger females than the total population, age would bias the association with sex.

Figure 2. Percentage of burials within each age group associated with superstructures.



Thus, the significantly greater number of males could be the result of their being "old" rather than their being male. A comparison of those buried with superstructure with the total sample indicates that even though the proportion of males buried with superstructure is greater than the proportion of males in the total population, they both follow the same

Table 2 **Percentage of burials in each age class associated with superstructures at Meinarti from levels 9–7 (1050A.D.–1150A.D.)**

Age class	No. burials	Burials with superstructure (N)	Burials with superstructure (%)
Fetus	0	0	–
0–6 months	0	0	–
7–12 months	11	2	18
13–24 months	14	1	7
25 months–6 years	44	10	23
7–10 years	17	5	29
11–15 years	8	2	25
16–20 years	7	4	57
21–25 years	52	21	47
26–30 years	33	21	64
31–35 years	26	14	54
36–40 years	15	5	33
41–45 years	17	12	71
46–50 years	10	7	70
51–55 years	1	1	100

Table 3 **Chi square values for association of sex and occurrence of superstructures at Meinarti from levels 9–7 (1050A.D.–1150A.D.)**

Provenience age	Burials with superstructures	Burials without superstructures	Total
Levels 9–7			
Males	44	20	64
Females	33	43	76
Total	77	63	140
Chi square (1 d.f.) = 9·0057*			

* Significant at the 0·001 level of confidence.

trends (see Figure 3). It can be concluded that the sample reflects the total population structure and that the association between sex and superstructure is valid.

Having determined age and sex as status factors, the final hypothesis was tested. This problem was approached by analyzing the mortality of the groups buried with and without superstructures. The survival curves visually depict two distinct patterns (see Figures 4 and 5) with the corresponding life tables clearly charting these differences (see Tables 4 and 5, and Figure 6).

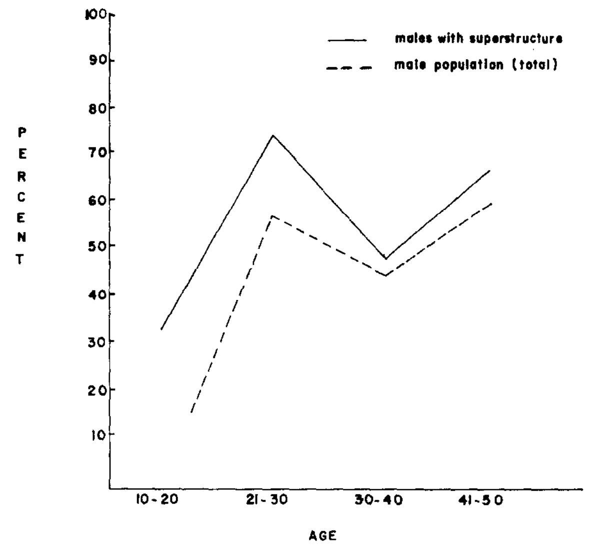


Figure 3. Percentage of males (total population) in each age group compared with percentage of males in each age group buried with superstructure.

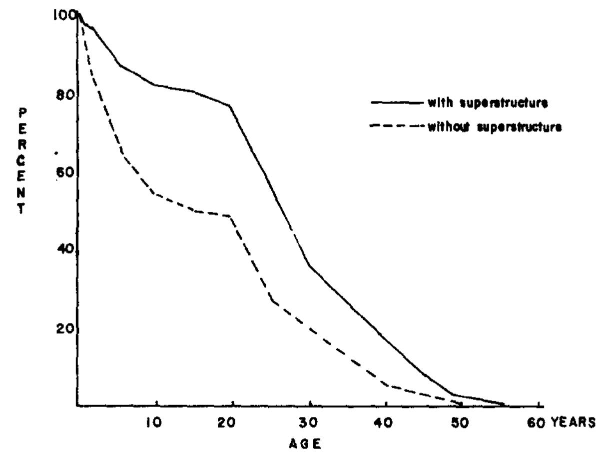


Figure 4. Percentage of persons buried with and without superstructures surviving at the end of each age interval, levels 9–7 (1050–1150A.D.).

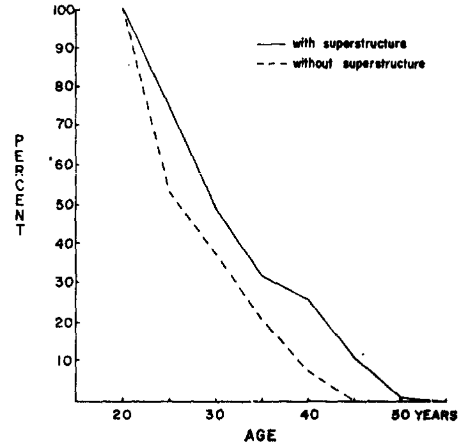


Figure 5. Percentage of adults buried with and without superstructures surviving at the end of each age interval, levels 9–7 (1050–1150A.D.).

Two alternative hypotheses have arisen in order to explain these differences.

(1) The mortality differences are artifacts of the associations between burial type and age, and thus represent one group of persons in which status differentiation was based on age and sex.

(2) The mortality patterns reflect biological differences in terms of varying survival rates and, therefore, indicate a status factor in addition to age and sex.

Table 4 **Life table for persons buried without superstructure at Meinarti from levels 9–7 (1050A.D.–1150A.D.)**

x	d^1x	dx	lx	qx	Lx	ex^{0*}	ex^0
0–6 months	0	0	1000	0	1000	6.12	16·65
7–12 months	9	60	1000	60·0	970·0	5·13	16·15
13–24 months	13	86	940	92·6	896·5	4·43	17·15
25 months–6 years	34	228	854	267·0	739·0	3·82	18·15
7–10 years	12	80	626	128·0	585·0	4·04	19·20
11–15 years	6	40	546	73·4	525·0	3·54	17·70
16–20 years	3	20	506	39·6	495·0	2·79	13·95
21–25 years	31	205	486	422·6	382·5	1·88	9·40
26–30 years	12	80	281	284·0	241·0	1·89	9·45
31–35 years	12	80	201	398·0	161·0	1·45	7·25
36–40 years	10	67	121	555·3	87·5	1·09	5·45
41–45 years	5	33	54	611·0	32·5	0·80	4·00
46–50 years	3	21	21	1000	10·5	0·50	2·50
51–55 years	0	0	0	0	0	0	0
	150						

x The age interval.
d^1x The number of individuals dying at age x.
dx The number of individuals dying at age x based on a birth cohort of 1000.
lx The number of individuals living at age x.
q_x The probability of dying at age x multiplied by 1000.
L_x The number of individuals in the life table cohort alive between ages x and $x + 1$.
e_x^{0*} The expectation of life, or mean life-time remaining to those individuals attaining age x in age intervals.
e_x^0 The expectation of life in years.

Table 5 **Life table for persons buried with superstructure at Meinarti from levels 9–7 (1050A.D.–1150A.D.)**

x	d^1x	dx	lx	qx	L_x	e_x^{0*}	e_x^0
0–6 months	0	0	1000	0	1000	8·35	24·00
7–12 months	2	18	1000	18·0	991	7·35	23·50
13–24 months	1	9	982	9·1	977	6·38	24·90
26 months–6 years	10	95	973	97·6	926	5·40	24·00
7–10 years	5	48	878	54·7	854	4·90	23·50
11–15 years	2	18	830	21·7	821	4·22	21·10
16–20 years	4	38	812	46·8	793	3·19	15·95
21–25 years	21	199	774	257·0	697	2·43	12·15
26–30 years	21	199	575	346·0	476	2·08	10·40
31–35 years	14	130	376	346·0	311	1·39	9·45
36–40 years	5	48	246	195·0	222	1·69	8·35
41–45 years	12	117	198	590·0	139	0·96	4·80
46–50 years	7	70	81	864·0	46	0·63	3·15
51–55 years	1	11	11	1000	55	0·50	2·50
	107						

For abbreviations see Table 4.

On examination of the mortality data, the second hypothesis becomes most probable. Despite the positive associations which exist between burial with superstructures, increasing age and males; 24% of preadults (less than 20 years of age) and 43% of females in the population are buried with superstructure and, conversely, 47% of adults (greater than 20 years of age) and 37% of adult males of the population are buried without superstructure.

	Burials with superstructure (%)	Burials without superstructure (%)	Total (%)
Adults	53	47	100
Subadults	24	76	100
Adult Males	67	33	100
Adult Females	43	57	100

These percentages, though still upholding the previously established association, indicate that age and sex do not totally explain the distribution of the superstructures, and

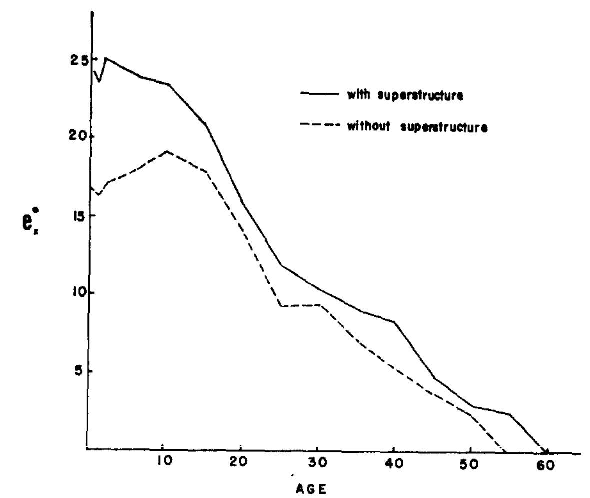
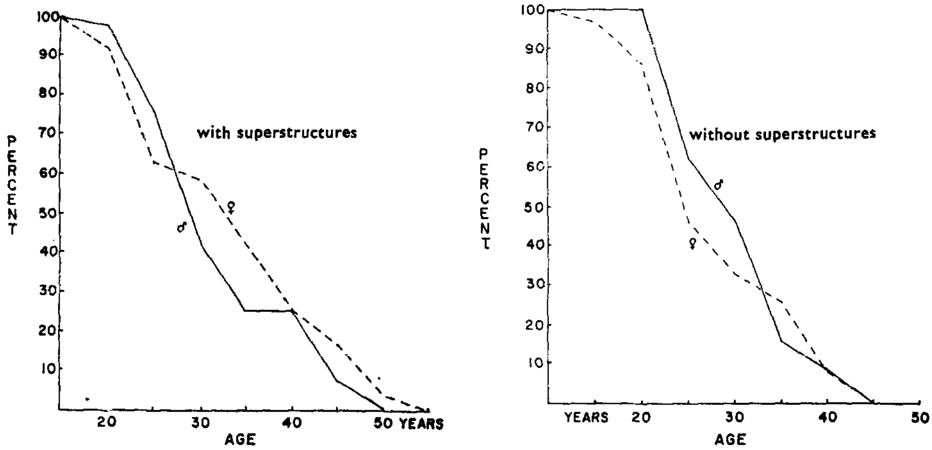


Figure 6. Life expectancy for each age group for individuals buried with and without superstructures.

Figure 7. Percentage of males and females surviving at the end of each age interval for individuals buried with and without superstructures.



that an additional status factor exists. Some distinction, for example, is indicated between those males of the same age buried with superstructure and those buried without them.

Analysis of the survival curves of males and females of the two groups further supports the second hypothesis (see Figure 7). These curves follow the expected mortality pattern of non-industrial societies with initially high female mortality (as a result of death at childbirth) and a subsequent rise in male mortality. The fact that these distributions follow the expected mortality patterns for agricultural populations indicates that they represent distinct groups in terms of mortality rather than one group differentiated only by age and sex status. This is not to say that at birth an individual was assigned to a specific status group but rather, those individuals who were buried with superstructures as a result of their status within the society had a lower mortality rate than those buried without structures. The differences in mortality between the groups, therefore, represent

Figure 8. Percentage of persons surviving at the end of each age interval, levels 9–8 (1050–1100 A.D.) and 7 (1100–1150A.D.).

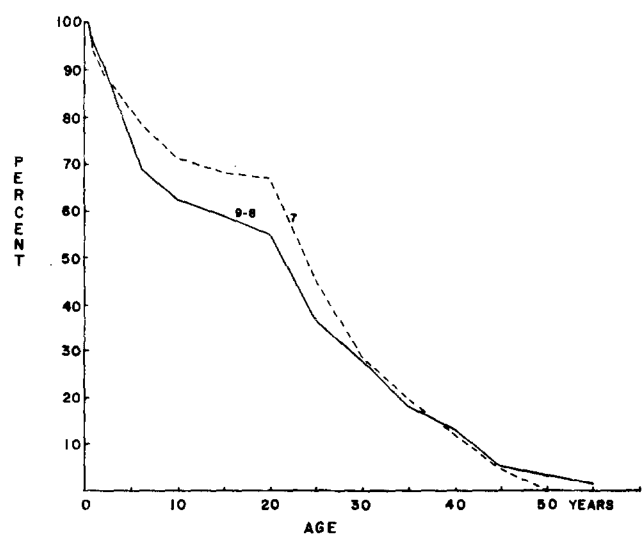


Table 6 **Life table for levels 9–8 (1050A.D.–1100A.D.) at Meinarti**

x	d^1x	dx	lx	q_x	L_x	e_x^{0*}	e_x^0
0–6 months	0	0	1000	0	1000	6·71	19·55
7–12 months	5	35	1000	35·0	982·5	5·71	19·05
13–24 months	8	56	965	58·0	937·0	4·90	19·50
2–6 years	32	226	909	249·0	796·0	4·17	19·85
7–10 years	10	71	683	104·0	647·5	4·38	20·90
11–15 years	4	29	612	47·4	597·5	3·83	19·15
16–20 years	6	42	583	72·0	562·0	3·00	15·00
21–25 years	28	192	541	355·0	445·0	2·19	10·95
26–30 years	13	90	349	258·0	304·0	2·13	10·65
31–35 years	14	99	259	382·0	209·5	1·69	8·45
36–40 years	7	50	160	312·0	135·0	1·43	7·15
41–45 years	11	80	110	727·0	70·0	0·86	4·30
46–50 years	3	21	30	667·0	20·0	0·83	4·15
51–55 years	1	7	9	1000	5·0	0·50	2·50
	142						

For abreviations see Table 4.

biological differences in terms of survival and thus indicate an additional status factor which affected the mortality of the persons in the village.

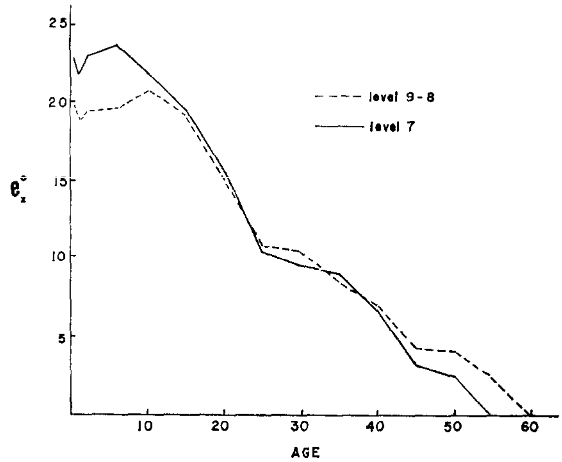
The second problem dealt with was the relationship between the mortality and settlement patterns for levels 9–8, 7 and 6–4 (see Swedlund & Armelagos, 1968). As previously discussed, Adams (1968:190) has stated that archaeological evidence indicates levels 9–8 as a period of village growth, and level 7 as a period of decline at Meinarti. A comparison of the survival curves for these two levels apparently indicates level 7 as having a lower mortality than levels 9–8 (see Figure 8). Life table analysis, however, indicates that although the life expectancy of level 7 for subadults (ages 0–20) is greater than levels 9–8 (with the probability of dying correspondingly lower), the reverse is true for the adult segment of the population (see Tables 6 and 7, Figure 9). Truncation of the subadult portion of the survival curve supports this analysis (see Figure 10), thus revealing the initial survival curve (Figure 8) to be influenced by the apparent lower mortality of the subadult age groups.

Table 7 **Life table for level 7 (1100A.D.–1150A.D.) at Meinarti**

x	d^1x	dx	lx	q_x	L_x	e_x^{0*}	e_x^0
0–6 months	0	0	1000	0	1000	7·30	22·50
7–12 months	5	48	1000	48·0	976·0	6·30	22·00
13–24 months	6	57	952	59·9	923·5	5·59	22·95
26 months–6 years	12	115	895	12·8	837·5	4·92	23·60
7–10 years	6	58	780	74·3	751·0	4·58	21·90
11–15 years	4	38	722	52·6	703·0	3·91	19·55
16–20 years	1	10	684	14·6	679·0	3·10	15·50
21–25 years	23	220	674	326·0	564·0	2·13	10·65
26–30 years	18	172	454	379·0	368·0	1·93	9·65
31–35 years	9	85	282	301·0	239·5	1·80	9·00
36–40 years	8	74	197	376·0	160·0	1·37	6·85
41–45 years	8	74	123	602·0	86·0	0·89	4·45
46–50 years	5	49	49	1000	24·5	0·50	2·50
51–55 years	0	0	0	0	0	0	0
	105						

For abbreviations see Table 4.

Figure 9. Life expectancy for each age group, levels 9–8 (1050–1100A.D.) and level 7 (1100–1150A.D.).



Furthermore, analysis of the adult sex ratio reveals level 7 to have the lowest percentage of females in the Meinarti series (33 % in comparison to 61 % for levels 9–8, for example, see Table 8). It can, therefore, be inferred that the reduction of the number of subadults, and the resulting low mortality revealed by the survival curves and life tables for this age group, is a result of a decrease in the number of births. In other words, the scarcity of subadult burials can be attributed to their absence from the community rather than their having survived to an older age.

The low mortality for level 7 subadults as indicated by life expectancy, probability of dying and the survival curves, appears not to be a true reflection of the survival. Truncation of this portion of the distribution as facilitated by the life table is necessary to get a more accurate picture of the mortality. The results of this show the mortality of levels 9–8 to be lower than level 7, lending support to Adam's analysis.

Although the burial data from levels 6–4 is somewhat incomplete (superstructures have been washed away), a comparison of the available mortality statistics and those of levels 9–7 provides some useful information. The survival curves for these two periods indicate the mortality rate of levels 9–7 to be substantially lower than the mortality of

Figure 10. Percentage of adults surviving at the end of each age interval, levels 9–8 (1050–1100 A.D.) and 7 (1100–1150A.D.)

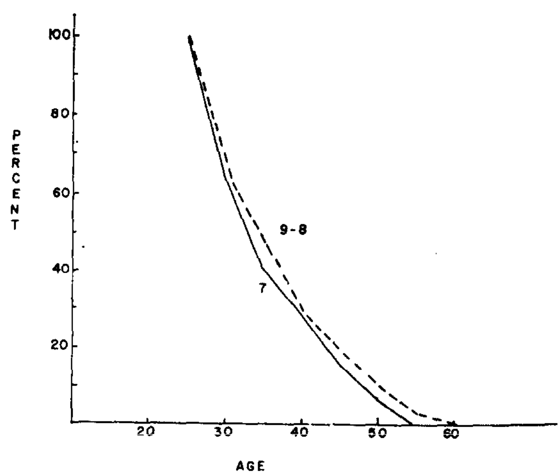


Table 8 **Percentage of males and females at Meinarti**

Levels	Male *N*	Male %	Female *N*	Female %
Levels 9–4 (1050A.D.–1300A.D.)	79	47	89	53
Levels 9–7 (1050A.D.–1100A.D.)	64	46	74	54
Levels 9–8 (1050A.D.–1100A.D.)	25	39	39	61
Level 7 (1100A.D.–1150A.D.)	39	67	29	33
Levels 6–4 (1150A.D.–1300A.D.)	14	48	15	52

levels 6–4 (see Figure 11). This difference is substantiated by the life table analysis of the two levels (see Tables 9 and 10). Life expectancy for levels 9–7 is consistently and substantially greater than for levels 6–4 and the probability of dying consistently lower. This analysis supports the evidence presented by Adams indicating levels 6–4 as a period of further decline in the village.

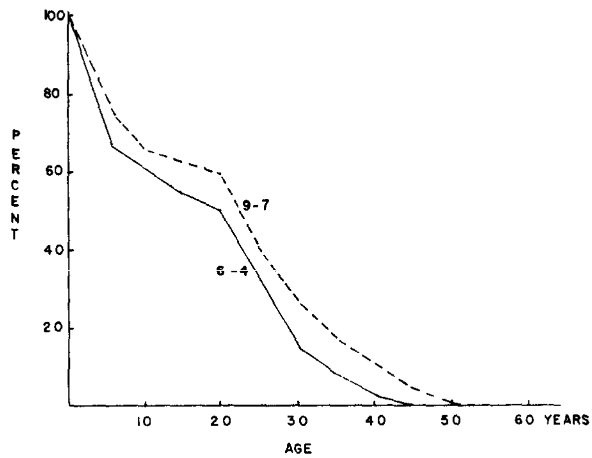


Figure 11. Percentage of persons surviving at the end of each age interval, levels 9–7 (1050–1150 A.D.) and 6–4 (1150–1300 A.D.) at Meinarti.

5. Concluding Remarks

We have attempted to relate changes in settlement patterns and several demographic parameters of a population. It was noted that such analysis has to be defined within the delimited spatial and temporal framework of the archaeological settlement. Within this context, demographic and archaeological analysis can be used as a complementary means of testing hypotheses concerning the mortality patterns of the group under study.

Table 9 **Life table for levels 9–7 (1050A.D.–1150A.D.) at Meinarti**

x	d^1x	dx	lx	q_x	L_x	e_x^{0*}	e_x^0
0–6 months	0	0	1000	0	1000	7·10	21·50
7–12 months	10	39	1000	39·0	980·5	6·10	21·00
13–24 months	15	59	961	61·4	931·5	5·40	22·00
2–6 years	44	172	902	190·7	816·0	4·55	21·75
7–10 years	17	66	730	90·4	697·0	4·50	21·50
11–15 years	8	32	664	48·2	648·0	3·90	19·50
16–20 years	7	28	632	44·3	618·0	3·07	15·35
21–25 years	50	198	604	327·8	505·0	2·19	10·95
26–30 years	33	131	406	322·6	340·5	2·02	10·10
31–35 years	25	99	275	360·0	225·5	1·74	8·70
36–40 years	15	57	176	323·9	147·5	1·45	7·25
41–45 years	19	73	119	613·4	82·5	0·90	4·50
46–50 years	11	41	46	891·3	25·5	0·59	2·95
51–55 years	1	5	5	1000	2·5	0·50	2·00
	255						

For abbreviations see Table 4.

Table 10 **Life table for levels 6–4 (1150A.D.–1300A.D.) at Meinarti**

x	d^1x	dx	lx	q_x	L_x	e_x^{0*}	e_x^0
0–6 months	1	14	1000	14·00	993·0	6·25	17·25
7–12 months	5	68	986	69·0	936·0	5·33	17·15
13–24 months	1	14	918	15·2	915·5	4·70	18·50
2–6 years	17	233	904	257·7	787·5	3·76	17·80
7–10 years	4	55	671	82·00	643·5	3·90	18·50
11–15 years	3	41	616	66·5	595·5	3·20	16·00
16–20 years	5	68	575	118·3	541·0	2·40	12·00
21–25 years	13	180	507	355·0	471·0	1·65	8·25
26–30 years	13	180	327	550·4	237·0	1·29	6·45
31–35 years	5	66	147	449·0	114·0	1·26	6·30
36–40 years	4	49	81	604·9	56·5	0·89	4·45
41–45 years	2	32	32	1000	16·0	0·50	2·5
46–50 years	0	0	0	0	0	0	0
	73						

For abbreviations see Table 4.

Four factors qualify Meinarti as a good working example for this type of analysis:

(1) Clear spatial and temporal definition.
(2) Correlated stratigraphy between the village and the stratified cemetery.
(3) Evidence that the same group of people inhabited the site throughout its occupation and no indications of migrations.
(4) Complete excavation of the cemetery.

The two problems discussed illustrate the manner in which populational and archaeological analysis can be used in a complementary manner. In the analysis of the Meinarti mortality data, sex, age and an additional factor were shown to be determinants of status. Furthermore, it was demonstrated that the mortality patterns of the groups with and without superstructures reflect biological differences in terms of survival.

In the second problem, mortality analysis was used to test hypotheses put forth by Adams concerning the growth and decline of the village of Meinarti during the periods represented by levels 9–8, 7 and 6–4.

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