percentage of people died in both rural and urban samples (Tables 4.221-1 and 4.221-2 and Figure 4.221-1). The difference between distributions of deaths by age category for the rural and urban samples was statistically insignificant as tested with nonparametric test of Kolmogorov and Smirnoff (Blalock, 1960). Males had slightly greater life expectancies (2-3 years) than females in both populations (Henneberg and Henneberg 1990b, 1998a, 1994 in manuscript). These differences between sexes were not statistically significant (Chiang 1960, Henneberg and Strzałko 1975).

For many prehistoric and historical pre-industrial populations it has been reported that females lived on average somewhat fewer years than males (Angel 1947, 1972, Acsádi and Nemeskéri 1970, Weiss 1973, Pardini et al. 1983, Smith et al. 1984, y'Edynak 1989). Angel (1947) examined Greek skulls from Neolithic to Byzantine times and showed that between 3500 BC and 1309 AD the difference in the average age at death between males and females was about 5.0 to 10.5 years in each time period. In Classic Greece (650 BC) average age at death for men was 42.6 years and for women 36.6 years. In Hellenistic times (300 BC) the difference between males and females in average age at death, based on examination of skulls, was even greater than in Classic Greece (44.5 and 34.6 years respectively) (Angel, 1947, 1972). Smaller differences in average age at death between males and females were observed among Iron Age populations in Italy. In Pontecagnano (Salerno) in 7th-6th c. BC. females lived around 3 years shorter than males and in 5th-4th c. BC around 5 years shorter than males (Pardini et al. 1983). Similar differences in life expectancy between females and males, around 4 years, were reported for the Levant in Neolithic through Hellenistic to Roman times (Smith et al. 1984). Despite the well documented fact of sex difference in life expectancy calculated from life tables for pre industrial populations, caution should be taken in interpreting such differences. Angel (1947) noted that differences in life expectancy between sexes could be enhanced by some methods of estimating the age at death. Because various methods of estimating the age at death were used by various researchers comparison of the results from literature and interpretation of sex differences between populations was rather difficult . Some methods were more accurate in the lower age range (changes on pubic symphysis being an example) leading to underestimation of age at death for the population if used exclusively (Angel 1947, Suchey 1979, Meindl et al. 1983). In this thesis the age of individuals in both rural and urban populations was estimated using all available and applicable methods. This reduced errors which could influence the characteristics of constructed life tables and therefore allowed further comparisons between studied populations (Krogman 1962, Acsádi and Nemeskéri 1970, Meindl et al. 1983, Buikstra and Mielke 1985).

4.222. In dental samples

In both samples the individuals with teeth had similar distribution of deaths by age as in entire samples (Figures 4.222-1 and 4.222-2). The only statistically significant difference was in the youngest age category because there were very few skeletons of children preserved in both samples and only permanent teeth of children were included in the analysis. Individuals with teeth from the rural and urban samples have similar number of deaths in all age categories (Figure 4.222-3). The differences between the two distributions of mortality by age are statistically insignificant as tested with nonparametric test of Kolmogorov-Smirnoff (Blalock, 1960). There was no statistically significant difference in the distribution of deaths between rural and urban samples in each sex category (Figures 4,222-4 and 4.222-5). The average 20 years old individual with teeth from the rural sample lived another 21.7 years and from the urban sample 21.9 years (Tables 4.222-1 and 4.222-2). Females with teeth in the rural sample died when they were 40.4 years old on average, and those from the urban sample died at 41.6 years (Tables 4.222-3 and 4.222-4). Males died slightly older than females, when they were 42.3 years old in the rural sample and 44.1 years of age in the urban one (Tables 4.222-5 and 4.222-6). As in the entire rural and urban skeletal samples, the differences in life expectancy between sexes were not statistically significant when tested with the method described by Chiang (1960) and Henneberg and Strzałko (1975).

TABLES AND FIGURES

Table 4.221-1 Selected biometric functions of the life table constructed for the skeletal sample from the rural area of Metaponto. N=272

Age (x)	Dx	dx	lx	qx	ex	cx
0.00	32.17	11.83	100.00	0.12	35.55	13.23
5.00	8.17	3.00	88.17	0.03	34.98	12.19
10.00	5.17	1.90	85.17	0.02	31.12	11.85
15.00	6.50	2.39	83.27	0.03	26.78	11.55
20.00	57.63	21.19	80.88	0.26	22.49	19.77
30.00	60.38	22.20	59.69	0.37	18.70	13.67
40.00	38.05	13.99	37.49	0.37	16.82	8.58
50.00	26.22	9.64	23.50	0.41	13.85	5.26
60.00	37.72	13.87	13.87	1.00	10.00	3.90

Age - age categories 0-4.99, 5-9.99, 10-14.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of individuals alive in age category

Table 4.221-2. Selected biometric functions of the life table constructed for the skeletal sample from the urban necropolis Crucinia. N=412.

Age (x)	Dx	dx	lx	qx	ex	cx
0.00	26.50	6.43	100.00	0.06	38.38	12.61
5.00	14.00	3.40	93.57	0.04	35.85	11.97
10.00	4.50	1.09	90.17	0.01	32.10	11.68
15.00	9.50	2.31	89.08	0.03	27.47	11.45
20.00	74.82	18.16	86.77	0.21	23.13	20.24
30.00	104.15	25.28	68.61	0.37	17.93	14.58
40.00	71.65	17.39	43.33	0.40	15.47	9.02
50.00	53.48	12.98	25.94	0.50	12.49	5.07
60.00	53.40	12.96	12.96	1.00	10.00	3.38

Age - age categories 0-4.99, 5-9.99, 10-14.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of individuals alive in age category

Table 4.222-1 Selected biometric functions of the life table constructed for the skeletal sample from the rural area of Metaponto. Individuals with teeth. N=176.

Age (x)	Dx	dx	lx	qx	ex	cx
0.00	2.50	1.42	100.00	0.01	39.11	12.70
5.00	4.50	2.56	98.58	0.03	34.63	12.44
10.00	2.50	1.42	96.02	0.01	30.49	12.19
15.00	5.50	3.13	94.60	0.03	25.91	11.90
20.00	45.16	25.66	91.48	0.28	21.71	20.11
30.00	46.67	26.52	65.82	0.40	18.22	13.44
40.00	25.67	14.59	39.30	0.37	17.14	8.19
50.00	16.50	9.38	24.72	0.38	14.31	5.12
60.00	27.00	15.34	15.34	1.00	10.00	3.92

Age - age categories 0-4.99, 5-9.99, 10-14.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of individuals alive in age category

Table 4.222-2 Selected biometric functions of the life table constructed for the skeletal sample from the urban necropolis Crucinia. Individuals with teeth. N=175

Age (x)	Dx	dx	lx	qx	ex	cx
0.00	1.50	0.86	100.00	0.01	39.79	12.51
5.00	4.00	2.29	99.14	0.02	35.11	12.31
10.00	2.00	1.14	96.86	0.01	30.88	12.10
15.00	4.50	2.57	95.71	0.03	26.22	11.87
20.00	36.95	21.12	93.14	0.23	21.88	20.75
30.00	51.78	29.59	72.03	0.41	16.82	14.38
40.00	31.28	17.88	42.44	0.42	15.07	8.42
50.00	21.78	12.45	24.56	0.51	12.40	4.61
60.00	21.20	12.11	12.11	1.00	10.00	3.04

Age - age categories 0-4.99, 5-9.99, 10-14.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of individuals alive in age category

Table 4.222-3. **Selected biometric functions of the life table constructed for the skeletal sample from the rural area of Metaponto. Females with teeth. N=103.**

Age (x)	Dx	dx	lx	qx	ex	cx
20.00	31.67	30.89	100.00	0.31	20.37	41.52
30.00	29.67	28.94	69.11	0.42	17.23	26.83
40.00	16.67	16.26	40.16	0.40	16.05	15.73
50.00	10.50	10.24	23.90	0.43	13.57	9.22
60.00	14.00	13.66	13.66	1.00	10.00	6.71

Age - age categories 20-29.99, 30-39.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of females alive in age category

Table 4.222-4. Selected biometric functions of the life table constructed for the skeletal sample from the urban necropolis Crucinia. Females with teeth. N=88.

Age (x)	Dx	dx	lx	qx	ex	cx
20.00	22.28	25.32	100.00	0.25	21.56	40.52
30.00	27.12	30.81	74.68	0.41	17.17	27.50
40.00	15.78	17.94	43.86	0.41	15.72	16.19
50.00	10.45	11.87	25.93	0.46	13.13	9.27
60.00	12.37	14.05	14.05	1.00	10.00	6.52

Age - age categories 20-29.99, 30-39.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of females alive in age category

Table 4.222-5. Selected biometric functions of the life table constructed for the skeletal sample from the rural area of Metaponto. Males with teeth. N=59

Age (x)	Dx	dx	lx	qx	ex	cx
20.00	13.50	23.08	100.00	0.23	24.06	36.77
30.00	17.00	29.06	76.92	0.38	19.78	25.93
40.00	9.00	15.38	47.86	0.32	18.75	16.70
50.00	6.00	10.26	32.48	0.32	15.26	11.37
60.00	13.00	22.22	22.22	1.00	10.00	9.24

Age - age categories 20-29.99, 30-39.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of males alive in age category

Table 4.222-6. **Selected biometric functions of the life table constructed for the skeletal sample from urban necropolis Crucinia. Males with teeth. N=75.**

Age (x)	Dx	dx	lx	qx	ex	cx
20.00	14.67	19.56	100.00	0.20	22.25	40.54
30.00	24.67	32.89	80.44	0.41	16.45	28.76
40.00	15.50	20.67	47.55	0.43	14.37	16.72
50.00	11.33	15.11	26.88	0.56	11.57	8.69
60.00	8.83	11.77	11.77	1.00	10.00	5.29

Age - age categories 20-29.99, 30-39.99 etc.
Dx - number of deceased by age
dx - % frequency of deceased by age
lx - survivorship
qx - probability of dying
ex - life expectancy
cx - % of males alive in age category

All individuals . Rural (Pantalnello) and urban (Crucinia) samples.

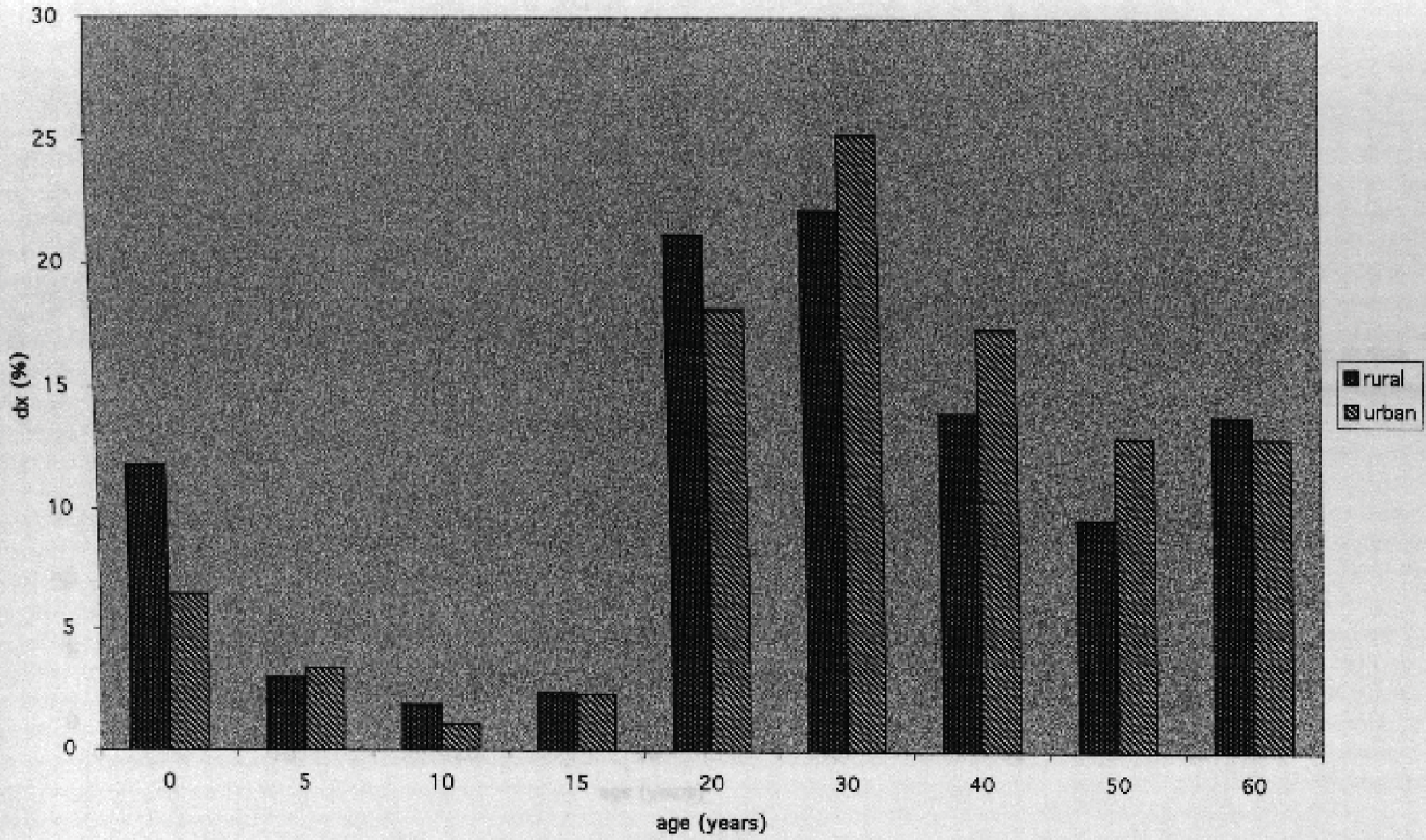


Figure 4.221-2. Comparison of life expectancy.
All individuals. Rural and urban samples.

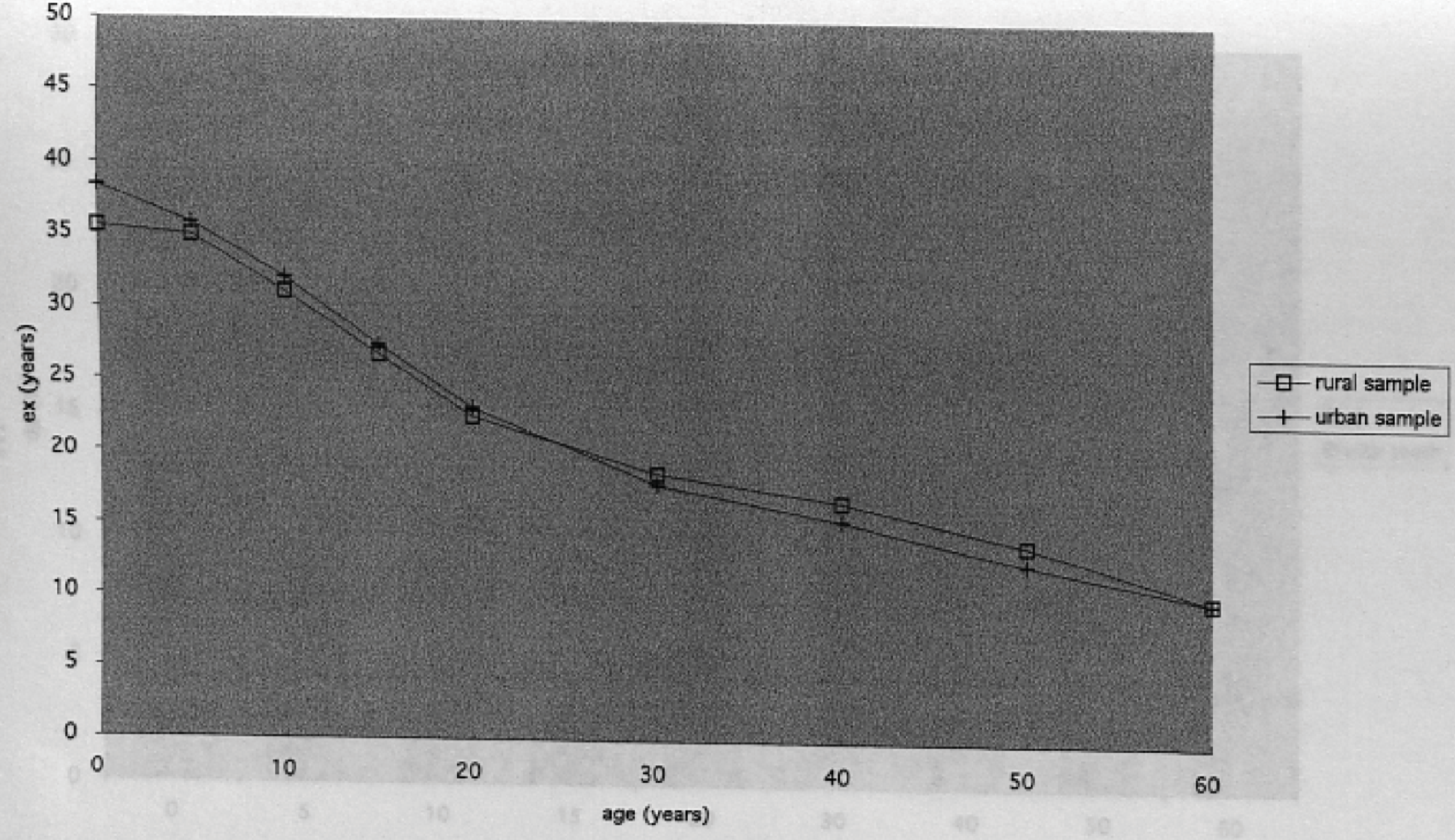
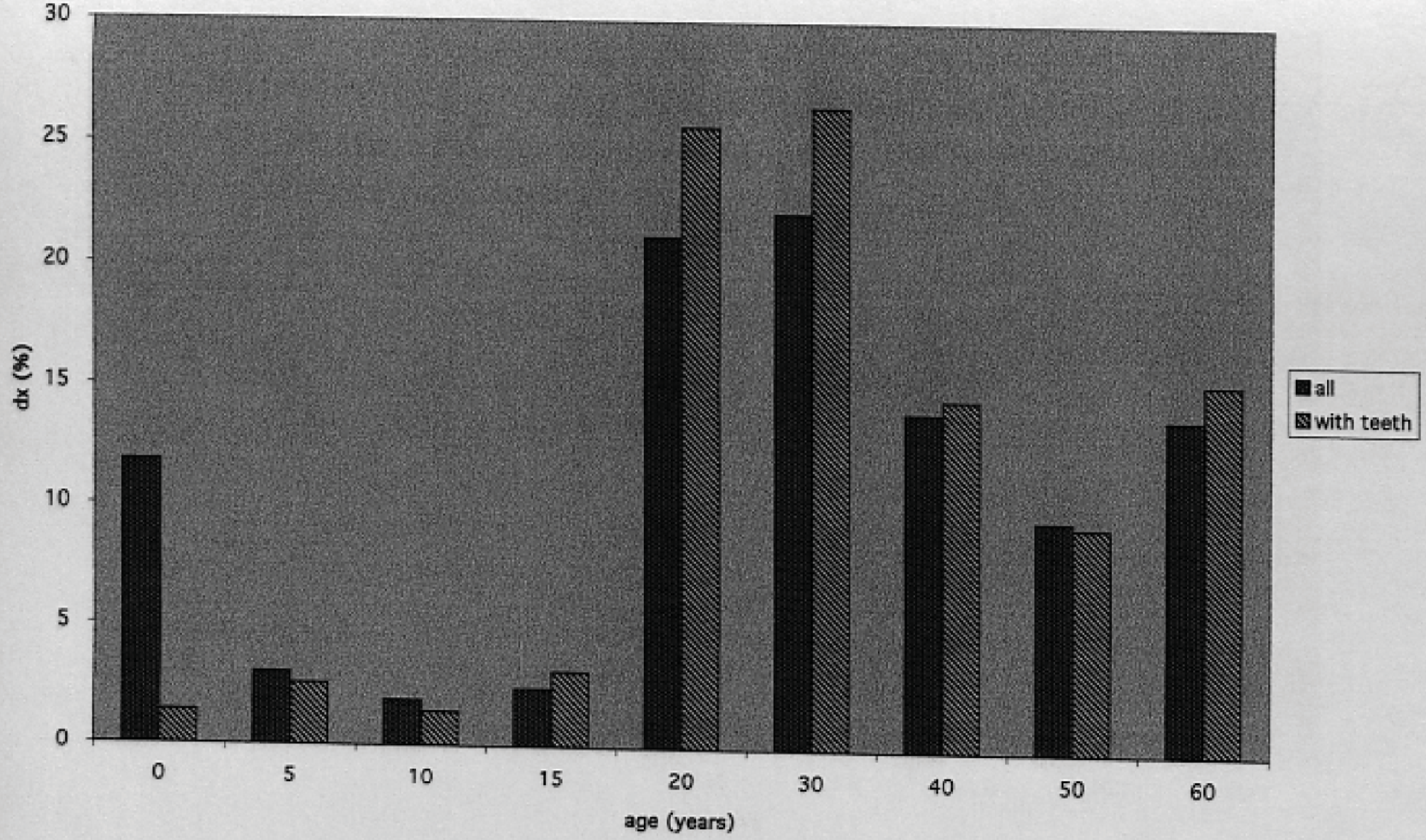
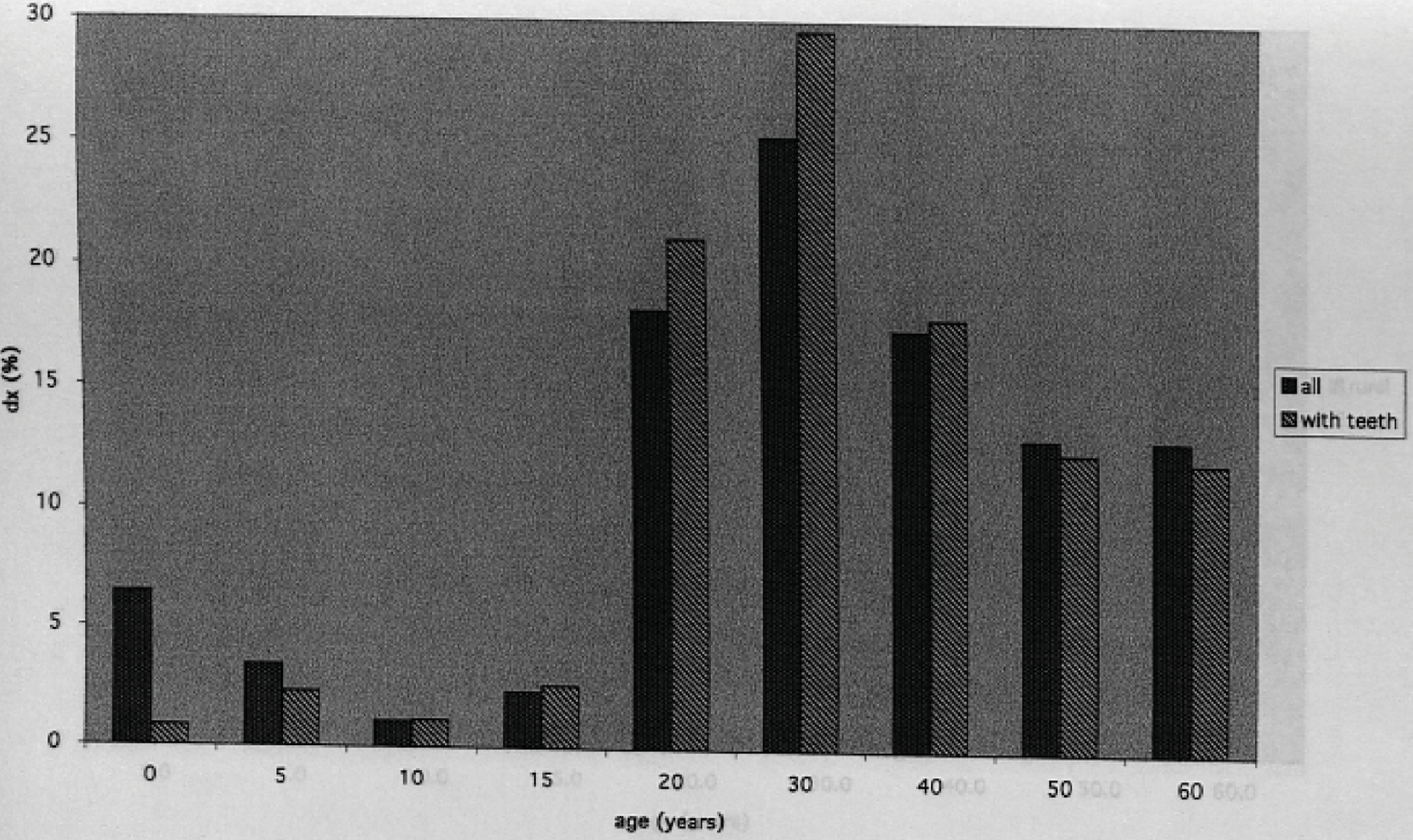


Figure 4.222-1 . Comparison of mortality.
All individuals and individuals with teeth. Rural samples.



… comparison of mortality.
All individuals and individuals with teeth. Urban samples.



All individuals with teeth. Rural - urban samples

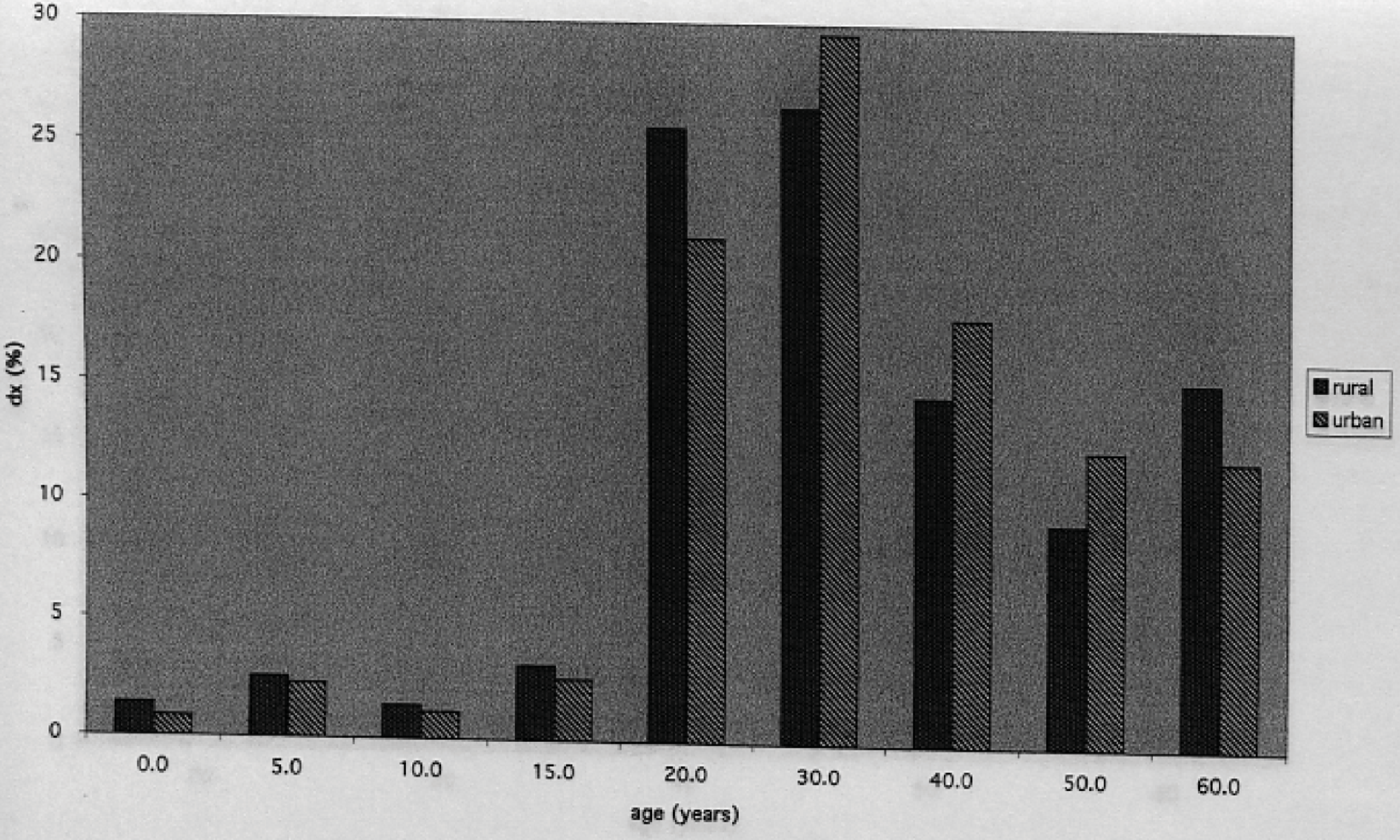
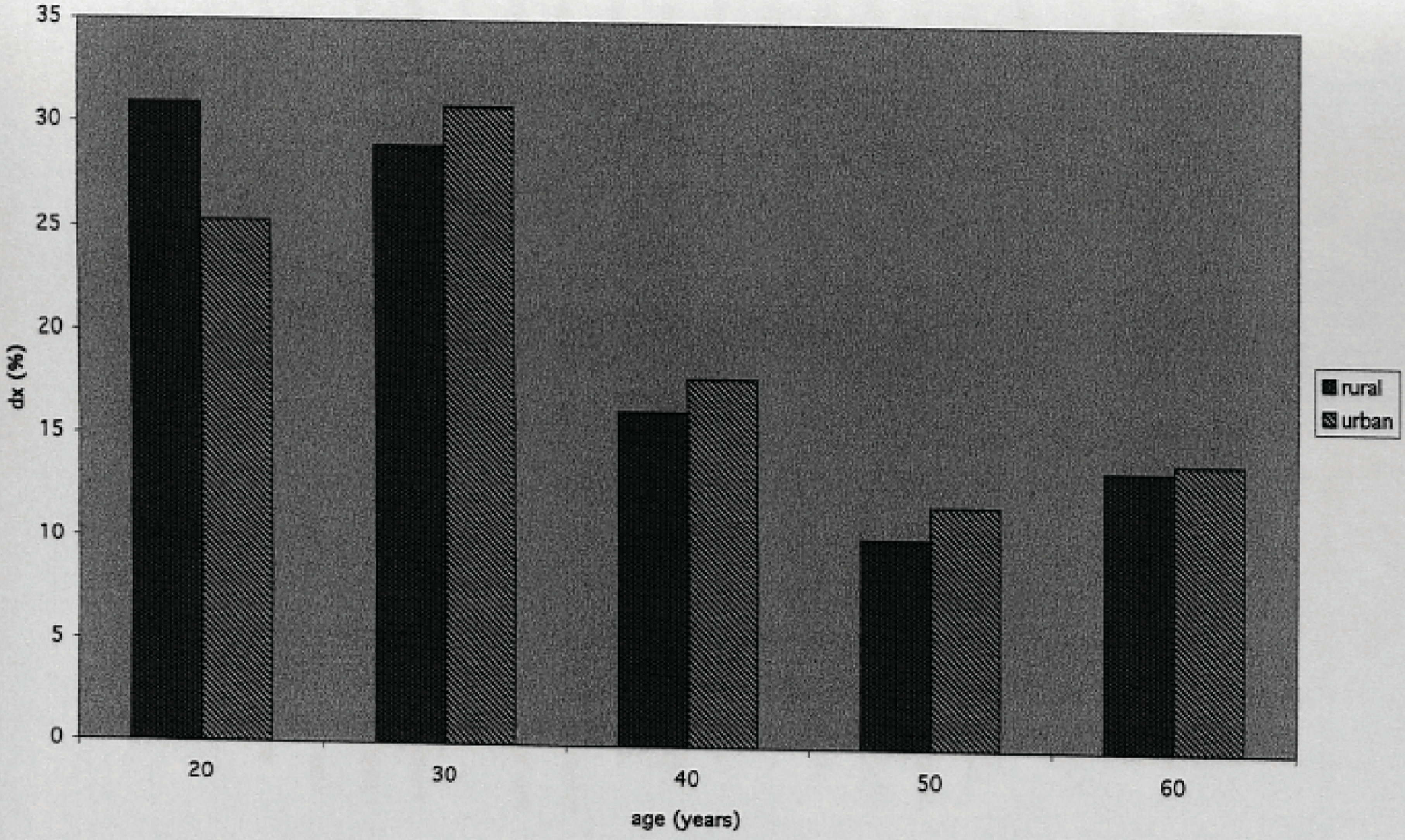
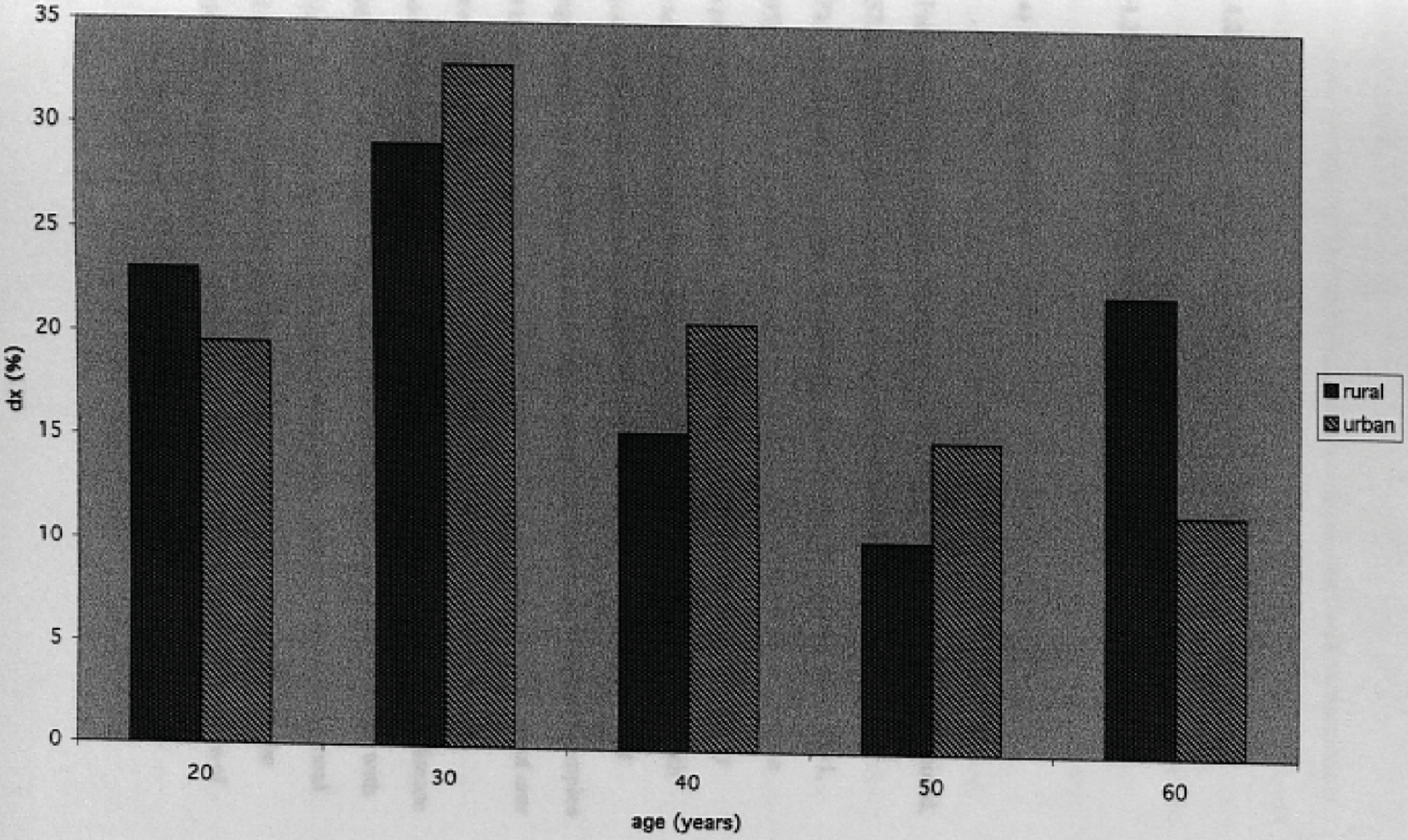


Figure 4.222-4 . Comparison of mortality.
Females with teeth. Rural - urban samples



Males with teeth. Rural - urban samples



4.23. Caries

4.231. Frequency and incidence of caries.

a) rural population

Frequency of dental caries among the rural Metapontines, both sexes combined, was 57.2% (Table 4.231-1). Females were more affected (63.5%) than males (45.5%) and the difference was statistically significant (Chi-squared=4.54, df=1, $p<0.05$). These results were obtained when all adult individuals with at least one tooth preserved for observation were taken into account. Individuals with empty tooth sockets with at least one of them indicating healing processes after the tooth was lost *ante mortem* were also included in the calculation. According to recent findings, tooth loss before death observed in most of archaeological skeletal samples could be attributed to the carious process (Lukacs 1992). Another likely cause of *ante mortem* tooth loss in living populations, and often related to advanced age, is periodontal disease. Recent investigations showed that in the past periodontal disease was rather rare and if it occurred, it seldom developed into severe periodontitis with tooth loss (Clarke and Hirsch 1991). There were only a few individuals in the rural dental sample who would have had periodontal problems probably leading to the tooth loss and for whom it was impossible to determine the presence or absence of caries. These four edentulous persons, each over 70 years old, were excluded from caries calculations.

To determine whether including individuals with only one tooth preserved into calculations could underestimate the frequency of caries in the population, the second calculation of caries frequency included all individuals with at least 10 teeth preserved for examination (Table 4.231-1). Caries frequency in this sub-sample was 62.2%, and was 5% higher than for the sub-sample A. The difference, however, was not statistically significant. To ensure that the observations of caries frequency conducted on incomplete dentitions could produce reliable results for further interpretation, the third sub-sample was compiled. It included only individuals with 16 or more teeth selected from the entire rural dental sample (Table 4.231-1). The frequency of caries in this sub-sample was 63.1% and was 0.9% higher than in the sub-sample B, and 5.9% higher than in the sub-sample A. The differences between the sub-samples A and B, A and C, B and C in caries frequency were not statistically significant. Thus the calculation of caries frequency performed on incomplete dentitions with a different number of teeth per individual available for examination (samples A, B and C) did not significantly alter the estimates for the population. Because most of the individuals in the rural sample had teeth missing *ante mortem* and *post mortem*, in the process of selection to the sub-samples B and C the sample size (both sexes combined) gradually diminished from 159 individuals (sub-sample A) to 65 individuals (sub-sample C). The statistically significant difference in caries frequency between females and males observed in the sub-sample A which included almost entire rural dental material, became not statistically significant in the sample B and C. It could be concluded then that the effect of a small sample size erased the significance of the difference in caries frequency between sexes which existed in this population.

Because there was no statistically significant difference between the sub-samples A, B and C in the frequency of caries in comparisons between populations, the result of caries frequency calculated for the sample A (Table 4.231-1) was used as the result representing the frequency of caries in the entire rural population. In comparisons between populations the larger sample size was also favoured.

To further justify the decision of compromising the completeness of the dental sample in favour of the larger sample size in dental caries investigations, the frequency of caries in the rural sample was calculated for two age groups. The first group included all individuals from age 16 onwards, except the four edentulous persons excluded for reasons explained above. This group was the same as the sample A used in the calculations of caries frequency where the criterion of selection to the sub-samples was the number of teeth available for observation. The second age group included all individuals 16-60 years of age. In the group of individuals 16-60 years of age, the frequency of caries was 62.9% . The result was 5.7% higher than for the group A but the difference was not statistically significant. The frequency of caries in the group 16-60 years old was also very similar to the frequency in the sub-sample B in the previous calculations (62.2%) where individuals selected to this sub-sample had 10 or more teeth each.

It seemed that the frequency of caries in the sub-sample B comprised of individuals with 10 or more teeth available for examination or in the group containing individuals 16-60 years of age, would best represent the real frequency of caries in the entire rural population. However, it has already been shown that there was no statistically significant difference in the frequency of caries between these two sub-samples and the sample A which included all but four individuals from the rural population. Therefore the frequency of caries in any of these sub-samples, sample A or both sub-samples B and 16-60 years could be considered an equally good representation of the real caries frequency in the studied population. Thus it was decided to use in further investigations the results of caries frequency calculated in the largest sample A containing the individuals 16-x years old with at least one tooth available for observation.

Caries is a progressive disease which develops slowly in adult dentition so, that the cavities can be seen only several years after the process has started (Silverstone et al. 1981, Nikiforuk 1985). Thus it could be expected that the frequency of caries among younger adults should be lower than among the older age groups (Whittaker et al. 1981). In the rural dental sample, frequency of caries and of tooth loss before death calculated together was slightly higher in the older adult age group, sexes combined (59.3%, 41-x years of age) than in the younger adults (56.2%, 16-40 years of age) but the differences were not statistically significant. The same trend was observed in females and in males separately (females: 60.0%, 16-40 years and 64.7%, 41-x years of age; males: 48.6%, 16-40 years and 50.0%, 41-x years of age), but the differences between the younger and older groups in caries frequency were not statistically significant.

Caries incidence among adults from the rural Metaponto was 5.8%, sexes combined, only if the number of teeth with carious lesions (without *ante mortem* tooth loss) was considered as a percentage of all teeth available for examination (Table 4.231-2). The incidence of caries was 10.2% when the teeth lost before death and presumably due to caries, were included into the calculation (total number of carious teeth among total number of teeth and a.m.loss). There was no statistically significant difference between the rural females and males in the incidence of caries observed on teeth alone, without including a.m. tooth loss into calculations, although the value for females was higher than for males (6.1% and 5.3% respectively). There was a statistically significant difference (Chi-squared=4.63, df=1, $p<0.05$) between the females and the males in the percentage of teeth lost before death (females 5.4%, males 3.3%). Generally females were slightly more affected by caries than males (carious teeth and a.m.loss, 11.2% and 8.5% respectively). This difference was statistically sigificant (Chi-squared=3.92, df=1, $p<0.05$).

Molars were the most affected by caries followed by premolars (Table 4.231-3, Fig 4.231-1). More carious teeth and teeth lost before death were observed in the mandible than in the maxilla, and the difference in frequency of caries between lower and upper jaws was highly statistically significant (Chi-squared=28.32, df=1, $p<0.001$, sexes combined). Lower molars were almost twice as often affected by caries, or were lost most probably due to caries, than were the upper molars. There was no difference between the left and right side of the jaws in the percentage of carious teeth and teeth lost before death. A similar pattern in caries topographical distribution was observed among the rural females and males. This pattern was generally similar to that found by most researchers, although some authors found maxillary dentition more affected by caries than the mandibular teeth (Lunt 1974, Whittaker et al. 1981, Nikiforuk 1985, Molnar and Molnar 1985, Fornaciari et al. 1985-86, Walker and Erlandson 1986, Varrela 1991, Lukacs 1992).

Among 121 recorded carious lesions on teeth of the rural Metapontines there were 43% pulpal caries. It was often so severe that the tooth crown was completely decayed with only remnants of roots left in the socket (stage 3 and 4 of caries penetration) (Figure 3.323-1, Table 4.231-4). Females had slightly lower percentage of pulpal caries and completely destroyed crowns among all carious teeth than males (42.0% and 45.0% respectively, stages 3+4 of caries penetration) but the difference was not statistically significant. More enamel caries among all carious teeth were observed in the rural females than males (34.6% and 15.0% respectively) and the difference was statistically significant (Chi-squared=5.07, df=1, $p<0.05$). An opposite trend was observed in the percentage of dentinal caries, where males had 40.0% and females had 23.5% of dentinal lesions among all carious teeth, but this diference was not statistically significant (Chi-squared=3.56, df=1). Because the teeth were not radiologically examined it was sometimes difficult to distinguish between the enamel and dentinal caries. Preparation of histological sections from teeth with caries found in archaeological material, was both impractical and impossible since the technique is destructive (Swardstedt 1966, Whittaker et al. 1981). Recent investigations have shown that small carious lesions that are visible macroscopically, especially those developed in fissures, have already penetrated through the enamel into the dentine (van Amerongen et al. 1992). Thus, the differences found between the females and males in the two less severe categories of caries should be treated with caution. It may be more practical and less prone to error to treat the two categories of caries, enamel and dentinal, as one type. When scores of enamel and dentinal caries were pooled together there was no difference between the rural females and males in the percentage of the less developed carious lesions in the total number of caries (58.0% and 55.0% of all carious teeth respectively). Among all degrees of caries penetration, the percentage of teeth lost before death presumably due to caries was 45.5%, sexes combined. Females had slightly higher proportion of a.m. tooth loss among total caries than males (48.1% and 39.4% respectively) but the difference was not statistically significant.

Distribution of caries according to the affected surface was similar in females and males from the rural Metaponto. The occlusal surface was the most commonly attacked dental surface followed by proximal caries (mesial and distal combined) (Table 4.231-5). No statistically significant differences were observed in the frequencies of each type of caries between the females and the males.

b) urban population

The data regarding caries in the urban population of Metponto are presented here only for comparison, and thus they are treated in less detail than those for the rural sample. The frequency of caries among the urban Metapontines was 72.7%, sexes combined (Table 4.231-6). Females were more affected by caries than males (80.0%

and 64% respectively) and the difference between sexes was statistically significant (Chi-squared=5.28, df=1, p<0.05). The incidence of caries was 17.6% (carious teeth in total number of teeth examined) or 23.6% if carious teeth plus a.m.loss was used in the calculation of a percentage of total number of teeth and alveoli of teeth lost a.m. (Table 4.231-7, A). Females had more carious teeth than males and the differences between the sexes in the incidence of caries were highly statistically significant when the incidence was calculated for teeth only and when it was calculated for the teeth plus a.m. losses (Chi-squared=45.47, df=1, p<0.001, and Chi-squared=26.35, df=1, p<0.001, respectively). More carious teeth were found in the mandible than in the maxilla and the most affected teeth were molars followed by premolars. The majority of carious lesions were enamel caries while both sexes had a similar percentage of those lesions in the total number of caries including a.m. loss (Table 4.231-4). Females had a higher percentage of teeth lost before death than males and this difference was statistically significant (Chi-squared=20.87, df=1, p<0.001). Most frequently attacked by caries was the occlusal surface and both sexes displayed a similar pattern of distribution of caries on tooth surfaces.

c) rural - urban comparison

More urban than rural people had caries (Table 4.231-7 and Figure 4.231-2) and the difference in the frequency of caries between the rural and urban populations, sexes combined, was statistically significant (Chi-squared=8.56, df=1, p<0.01) (Figure 4.231-2). When the sexes were treated separately the statistically significant difference in caries frequency was present between the rural and urban females (Chi-squared=6.43, df=1, p<0.05). The urban males also had a higher frequency of caries than the rural males and the difference was statistically significant (Chi-squared=4.43, df=1, p<0.05). The differences between rural and urban populations were even more pronounced when values of caries incidence were compared. Urban people had almost three times as many carious teeth as rural people when caries incidence was calculated per each person, excluding a.m. losses. This difference was statistically significant (17.6% and 5.8% respectively, Chi-squared=136.9, df=1, p<0.001) (Table 4.231-7). Caries incidence calculated for carious teeth and teeth lost ante mortem was also statistically significantly higher among the urban than the rural people (23.6% and 10.2% respectively, Chi-squared=137.5, df=1, p<0.001). The urban females lost more teeth before death than the rural females and the difference was clearly statistically significant (9.6% and 5.4% respectively, Chi-squared=16.94, df=1, p<0.001). While the urban males had statistically significantly more carious teeth than the rural males there was no difference between the two groups in the percentage of teeth lost before death. The rural and urban population had similar patterns of caries distribution in the dentition. In both populations the lower jaw was more affected than the upper jaw and molar teeth were the most carious followed by premolars. The rural and urban populations differed from each other in the distribution of caries according to the degree to which the dental tissues were penetrated (Table 4.231-4). The rural population had a higher percentage of well developed carious lesions such as pulpal caries (18.0% and 7.1% respectively, Chi-squared=19.52, df=1, p<0.001) and had a higher percentage of teeth lost before death (45.5% and 30.8% respectively, Chi-squared=14.54, df=1, p<0.001) than the urban population. On the other hand, a higher percentage of enamel caries was detected in the dentition of urban people than in the teeth of the rural Metapontines (42.5% and 15.3% respectively, Chi-squared=50.42, df=1, p<0.001) and the difference was highly statistically significant. Rural and urban people also differed in the distribution of carious lesions with regard to the surface affected by the process (Figure 4.231-5). More occlusal and neck caries were observed among the urban population than in the rural. Instead, rural people had more distal and mesial (proximal) caries than urban Metapontines.

d) as compared to other populations

Frequency and incidence of caries observed in Metaponto was compared with populations from the Mediterranean region and world-wide, and covering the time of several millennia (Tables 4.231-8 and 4.231-9). The subsistence of the most populations chosen for comparison with Metapontines was based on agriculture in various stages of its development. To provide a contrast with agriculturists, caries incidence was also presented for a few populations with subsistence based on mixed economy, hunting and gathering, and on pastoralism.

The frequency of caries in the rural population of Metaponto (57.2%) was similar to the frequency of this disease among the Iron Age Greeks and Classic Greeks and similar to the frequency of caries in the coeval population from Pontecagnano, Italy (54.5%).The results of these comparisons tested with Chi-squared test were not statistically significant. There was no statistically significant difference in caries frequency between the rural Metapontines and Romans from 150 BC - 450 AD, between the rural people and the 1st c. AD Pompeii, and between the rural population from Metaponto and people from the Prehistoric Hungary. The frequency of caries among rural Metapontines was generally similar to coeval populations and agriculturists world-wide with exception of American agriculturists whose main product was maize. It has been suggested that maize had stronger cariogenic properties than wheat and other early European grain cultivars or its importance in the diet in prehistoric America was greater than the importance of various grains in the European diet, thus, the higher frequency of caries among the American agriculturists (Lubell et al. 1994). The frequency of caries in the rural Metaponto was higher than among pastoralists and hunter-gatherers and lower than among late Middle Ages Europeans with advanced agriculture and diet based mostly on grain products.

The caries incidence among the rural Metapontines compared with caries incidence among various populations world-wide followed similar pattern to the results of caries frequency (Table 4.231-9). However, there were also slight differences . Dental data found in the literature on caries incidence in various populations of agriculturists revealed that the rural Metapontines had an intermediate incidence of caries in comparison to many coeval populations in the region and world-wide. Beginning with the Mediterranean region, the incidence of caries in the rural Metaponto was similar to that in Classic Greece and to that of ancient Egyptians (the sample studied by Carr, 1960). It was lower than in coeval Alfedena, Central Italy, and lower than coeval Pontecagnano near Salerno in Southern Italy. The rural people had less carious teeth than Jomon and Yayoi from Japan. The rural Metapontines had more carious teeth than most populations of the European Neolithic. The exceptions were Neolithic Greeks, Italics and French but in these three cases the results could be affected by the small sample size. In contrast to the rural Metapontines the urban population of Metaponto had a percentage of carious teeth similar to the population from Alfedena which had one of the highest results within the Mediterranean region for the period studied. The urban people also had a statistically significantly higher percentage of carious teeth than the people from Pontecagnano.

e) discussion

It was shown by many researchers that variation in caries incidence among populations reflected variation in diet and subsistence (Turner 1979, Frayer 1984, Gilbert and Mielke 1985, Walker and Erlandson 1986, Lukacs 1992, Littleton and Frohlich 1993, Hillson 1996, Larsen 1995, 1997). Were this true, the intermediate level of caries incidence in the rural Metaponto and the much higher incidence of caries among the urban Metapontines requires further explanation.

In general, the frequency and incidence of caries in the rural population from Metaponto were similar to those found among agricultural populations. This is not a surprise because Metaponto was a colony producing barley and wheat in quantities allowing export of these products to Greece (Dunbabin 1948, Carter 1990b, 1998a). It could be expected that the agricultural products were the staple food in this rural population and the carbohydrate diet would be reflected in the frequency and incidence of caries.

The rural people were in permanent contact with the urban population, trading and exchanging agricultural products for other goods and foodstuffs. Preliminary results of the analysis of stable isotopes, δ^{13} C and δ^{15} N, in bone collagen from the rural and urban samples showed that the diet of both rural and urban populations contained substantial component of marine foods (Henneberg et al. 1995, Henneberg et al. 1999). Fish and shellfish contain fluoride and strontium, which both have cariostatic properties (Nikiforuk 1985). Studies of populations with diets based on, or containing high proportion of marine food showed a low caries rate (Walker and Erlandson 1986, Littleton and Frohlich 1993). Slightly lower incidence of caries in the rural Metaponto than in the coeval Pontecagnano and clearly lower than in Alfedena may have several other explanations. One of them could have been the concentration of fluoride in drinking water. It is known that in many parts of Italy natural drinking water contains high levels of fluoride (Torino et al. 1995). Fluoride prevents development of caries by increasing the resistance of the enamel surface to demineralisation by acids which are produced by bacteria from carbohydrates in food (Silverstone et al. 1981, Nikiforuk 1985, Henneberg 1991a). The analysis of water samples collected from natural springs within the rural area of Metaponto showed the concentration of fluoride around 1 ppm (Grobbelar, personal communication, Henneberg and Henneberg 1998a). This concentration of fluoride was within the lower range of the optimal one recommended for caries prevention (Nikiforuk