Addressing child mortality and under-five mortality (USM) has continuously been a global challenge. The world summit for children in 1990 called for a worldwide reduction in child mortality to reduce USM to below 70 deaths per thousand live births or one third reduction. Nations and organizations have continued to invest much resources and effort to promote child health. In Sub-Saharan Africa investments in health systems and interventions necessary to achieve these marks has been elusive. Despite this, maternal and child mortality and morbidities remain high. The purpose of this study was to identify the determinants of USM in Kisumu North District of Kisumu County. The specific objectives were: to examine the levels and trends of USM in Kisumu North District; to identify the determinants of the USM in Kisumu North District; and, to assess the influence of KAP on USM in Kisumu North District. The study design was a descriptive cross-sectional in nature targeting women of reproductive age (15-49) living in Kisumu North District for at least six months. Data was collected using both quantitative and qualitative approaches involving structured questionnaires, key informant interviews and focus group discussion with chiefs, health workers and household heads in the district. A randomly selected sample of 265 women participated in the interviewer administered questionnaire. Data was analyzed using SPSS version 16. Chi square statistics was used to assess the association between background factors and USM at 95% confidence interval and a p-value of 0.05. Qualitative data were analyzed thematically. Finding showed that slightly more than half (56.3%) of the respondents were aged below 30 years and 43.7% of the respondents were aged more than 30 years. Majority (85.9%) of the respondents were married. Most (36.9%) of the respondents had completed primary education, and only 3.1% of the respondents had post primary education. Majority (88%) of the respondents reported to have lost a child below five years old. The USM (52.5%) was higher among those aged below 30 years as compared to those below 30 years 47.5% (pvalue= 0.006). Level of education was a significantly association with USM (p-value = 0.007). Sign of use of latrine was also significant associated with USM (p-value ~ 0.012). The presence of latrine was significantly associated with USM (p-value = 0.03). Occupation, source of water, whether water is treated, type of dwelling place, place of delivery, immunization status of the child and whether the child had been sick in the last two weeks were not significantly associated with USM. KAP factors that were significant associated with USM included staff of the facilities being friendly (p-value = 0.01), children die due to poverty (p-value = 0.02), child with fever should be taken to the health facility without delay (p-value=0.01), children die because they are bewitched (p-value = 0.01), a child with fever should not be given injection (p-value = 0.01), immunization makes children sick (p-value = 0.01), children should not be given drugs bought from the shops (p-value = 0.01). The findings of this study indicate that the USM is very high in Kisumu North District and is associated with socio-demographic, environmental and KAP determinants. There is need to address health factors that contribute to high mortality rates in this district, and putting in place a well defined system targeting improved socio-economic empowerment of women aged IS-49, improved enrollment of women in school, a defined health system to enable early identification and timely care to children and their mothers.