The uneven distribution of ground-based instruments in the equatorial regions hinders our ability to obtain a global understanding of the dynamics and structure of the equatorial ionosphere. In Africa, which has been mostly devoid of ground-based instruments, the ionospheric density structure has been traditionally estimated by model interpolation over vast geographic areas, and that make difficult for the communication and navigation systems operating in the region. Recent ground- and space-based observations have shown that geomagnetic storms can have dramatic longitudinal differences in equatorial ionospheric electrodynamics, such as enhanced generation of F-region plasma irregularities, and super fountain effect at low latitudes. The vertical structures of the equatorial density distribution can be reconstructed by applying tomographic reconstruction technique on the ground-based GPS TEC and occultation TEC from GPS receivers’ onboard LEO satellites. One of the possible driving mechanisms that govern the equatorial electrodynamics is the vertical drift, which strongly affects the structure and dynamics of the ionosphere in the low/mid-latitude region. According to the observations performed at different longitudes, using recently deployed limited ground-based instruments, the vertical drift velocities and the vertical density distributions have significant longitudinal differences. This paper presents tomographically reconstructed density distribution and the corresponding vertical drifts observed at three different longitudes: East African, West African, and West American sectors. The drift is estimated using a technique using pairs of ground-based magnetometers. In the African sector stations from the AMBER, INTERMAGNET, and MAGDAS, and in the American sector SAMBA and LISN magnetometer arrays have been used for this study.