Because growth is a sensitive indicator of the health of infants and children, the assessment of growth plays a central role in child health monitoring. An integral part of growth assessment is the interpretation of anthropometric measurements with the help of normative data in the form of growth charts. Growth charts are also used in epidemiological studies to assess the growth of groups of children. Some countries rely on their own national growth charts, whereas in many countries growth assessment has to rely on charts from other countries or on multinational charts such as the WHO charts.

The normative character of growth charts derives from the fact that they describe the observed growth of children living in a defined geographic area. Because they aim to describe the growth of normal children, children with chronic illnesses that may affect growth and children receiving medications that potentially affect growth are usually excluded.

The WHO multinational growth charts depart from the usual model in that they represent the growth of selected children deemed to have desirable health characteristics. The WHO charts are based on longitudinal measurement of some 800 children (birth to 2 years of age) and cross-sectional measurement of about 6,000 children 1.5–5 years of age living in 6 locations around the world. To be included infants had to be fed according to WHO recommendations, i.e., were breastfed for the first year of life with no complementary foods before 6 months of age. Data for older children were excluded if their weight-for-age was deemed too high. The WHO thus utilized a prescriptive approach and the charts are referred to as ‘standards’, in contradistinction to all other growth charts that represent growth ‘references’ that aim to provide faithful descriptions of the populations they represent. The three national references presented here are based on cross-sectional data from the respective countries (USA, Netherlands, UK), whereas the Euro-Growth charts are based on longitudinal measurements of a multi-national sample. Aside from this technical similarity to the WHO
charts, the Euro-Growth charts are, like the national charts, strictly growth references.

Given the differences in approaches, it is not surprising that there are substantial differences among charts. The differences between charts are exemplified by weight for age during the first year of life. To visualize the differences, four growth references are shown in figure 1 expressed as z scores based on the WHO standards. It is evident that during the first 4–6 months of life weight-for-age differs considerably among all growth charts, with WHO being the largest. During the period 6–12 months, on the other hand, weight tends to be similar among the references, whereas WHO weight is lower than any of the references. The source of the differences between the WHO standards and the references presumably lies in the differences of approaches, although differences of a purely technical nature may also play a role.

The implications of the differences between references and the WHO standards are felt particularly in epidemiological investigations, where an entirely new set of cutoffs defining abnormal growth must be used. Implications for the growth assessment of individual children may be less important since growth monitoring relies mostly on longitudinal observations.

**Fig. 1.** National growth references expressed as z scores of the WHO standard. Males and females combined. CDC = Center for Disease Control, USA; Euro = Euro-Growth 2000; NL97 = Netherlands 1997; UK90 = United Kingdom 1990; WHO = WHO 2006.