Subgroup analysis with unspecified subgroup memberships has received increasing attention in recent years. In Shen and He (2015), a structured logistic-normal mixture model was proposed to model the subgroup distributions and the subgroup membership simultaneously, but under the assumption that the subgroups differ only in the means. In this paper, we consider a penalized likelihood approach for more general cases with heterogeneous subgroup variances. Despite substantial technical complications in the development of its statistical theory, we show that the penalized likelihood inference for the existence of subgroups and for the estimation of subgroup membership can be carried out in a similar fashion to that of Shen and He (2015). Empirical results with a simulation study and two real data examples demonstrate the usefulness of the proposed method.