On Investigators Bias in Estimation of Anaemia in a Large Scale Sample Survey

P. V. T. Krishna Mohan
Faculty of Biostatistics, Department of Community Medicine,
P.S.Medical College, Anand,
Gujarat, India.

T. K. Roy
International Institute for Population Sciences,
Deonar, Mumbai-400088,
India.

Large Scale surveys have become an important tool for providing information on a variety of important aspects to facilitate the process of program implementation and policy making in the field of health and family welfare in a country. Whereas considerable methodological advances have taken place to control sampling error in such surveys, relatively less attention is given to understand the role of non-sampling errors. As is well known, non-sampling errors can occur at various stages in the conduct of a survey. Efforts are being made to outline procedures to check non-sampling errors. Few such steps, for example, are intensive training of investigators in eliciting appropriate information from respondents, thorough editing of questionnaires in the field, improved monitoring and supervision of the fieldwork. In such large-scale surveys, it is generally necessary to employ large number of investigators to complete the survey in a reasonable period of time. One crucial aspect of the non-sampling error is the presence of investigator's bias. Stated simply, this refers to the extent of differences in an estimate, which are not real but are due to personal characteristics or ability of the investigators. For example, an investigator's ability to establish a rapport with a respondent, his ability and eagerness to carry out the instructions in an appropriate manner etc. Very little is known about such biases and means to control them.

The present paper is an attempt in this direction. It tries to examine whether estimates of anaemia vary according to investigators, whether and how the personal characteristics of the investigators like his educational qualifications and previous experience of work might influence the variation in the estimate.

Haemoglobin measurement is primary method for anaemia screening, and the large-scale National Family Health Survey (NFHS) conducted in India in 1998-99, for the first time, underlook to study the prevalence of anaemia in the country. Anaemia occurs usually from a nutritional deficiency of iron folate, vitamin B12 or some other nutrients. Anaemia is caused by various other reasons such as haemorrhage, infection, genetic disorders or chronic diseases and is the most widespread form of malnutrition in the world. In NFHS, anaemia level was measured using HemoCue instrument. This instrument uses single drop of blood from a finger prick, which is drawn into a cuvette and then inserted into a portable battery operated instrument. In less than one minute, the haemoglobin concentration is indicated on a digital read-out. Before anaemia testing, the investigator was required to obtain informed consent of a respondent. The investigator was supposed to describe the procedure to be followed for the test and the utility of the estimation of anaemia level while obtaining the consent.

The building up of a rapport with a respondent was important for the successful measurement. As a protocol, it was also important to follow an appropriate procedure such as selection of skin puncture site, preparation of the skin puncture site etc. It is important that the skin (usually third or fourth finger) must be completely dry before a puncture is made for collection of blood sample. Any residual alcohol (used to clean the finger) can cause haemolysis in the specimen obtained. It was important not to apply excessive massaging or squeezing of the finger for drawing the blood. This can cause the tissue juice to mix with and dilute the blood, which will result in erroneous test results. Hence the skills of an investigator can be crucial in obtaining the estimated level of anaemia

The present study is based on the survey conducted in the state of Andhra Pradesh in India. As a part of NFHS, the field-work in Andhra Pradesh was carried out between November 1998 to march 1999, and a total of 4032 eligible women (ever married women in 15-49) were interviewed. Five interviewing teams conducted the main field work, each team consisting of one field supervisor, one female editor, four female interviewers, and one health investigator. Health investigators (hereinafter referred as investigators) were paramedical persons and were supposed to measure height and weight and anaemia testing.

The study shows that the non-response rate varies according to investigators and their characteristics like education and experience. It is negatively associated with their level of education and work experience. The variation in haemoglobin level of women (who have given birth during last three years preceding the survey) by education and work experience of investigators has also been examined by controlling following characteristics of the respondents type of residence, geographic region, education, standard of living, number of children ever born, caste, body mass index, whether taken all the recommended iron and folic acid tablets during the previous pregnancy, place of delivery, whether delivered in caesarian section, whether had any post -partum complication, and her current pregnancy status (whether pregnant or breast-feeding or non-pregnant and non-breast-feeding) . The effect of investigator's education or work experience on the haemoglobin level, after controlling for the independent variables, was found to be statistically insignificant. The variables showing significant influence on the haemoglobin level are: level of education of women, whether had consumed all recommended tablets during last pregnancy, current pregnancy status and geographic region to which she belonged. Interestingly, the standard of living of a woman was not found to have significant association with her haemoglobin level.