

A GRADING SYSTEM FOR REPRODUCTIVE AND CHILD HEALTH INDICATORS IN SOUTHERN INDIA

KM Sabu¹, NSK Nair², A Ramachandra Bairy³ and J Roopalekha¹

¹Department of Health Information Management, Manipal College of Allied Health Sciences, Manipal University; ²Department of Statistics, Manipal University, Karnataka, India; ³Udupi District, Health Office, Karnataka State, India

Abstract. This study was carried out to develop a system for grading local government sectors (LGS) in regard to reproductive and child health (RCH). RCH indicators for Udupi District in southern India over a one year period were graded. All 146 LGS in 3 municipalities were ranked using the grading system into one of 5 grades. The grading system is based on 14 RCH indicators. There was a wide disparity in RCH among LGS, even though the overall key RCH indicators were good. Using this new grading system for each of the 146 LGS in Udupi District, Udupi, Karkala and Kundapura administrative divisions were all within the first three grades. This new system of grading care in the LGS based on RCH indicators, can be used as an easy reference tool to assess and compare the performance of each LGS. A similar system could be adapted by other countries using RCH indicators.

Keywords: grading system, local self government, reproductive child health indicators, India

INTRODUCTION

The concept of reproductive and child health (RCH) was brought to the forefront at the International Conference of Population and Development (ICPD) held in Cairo, Egypt in 1994. In 1997, the Indian government launched a RCH program as a key national program under the National Rural Health Mission (NRHM) (Ministry of Health and Family Welfare, 2009). In 2005, the second phase of the RCH program, RCH II under NRHM II

was started with three critical objectives of reducing total fertility rate, maternal mortality rate and infant mortality rate. RCH II emphasized strengthening financial management, monitoring capabilities at different levels and providing performance based funding to ensure adherence to program objectives. The program emphasized rewarding good performance and supporting weak performers through enhanced technical guidance (Ministry of Health and Family Welfare, 2009). Monitoring RCH indicators is important for a government to understand the health of a region. It helps for allocation of health funds to health care centers. Various challenges, such as weak management at lower levels of government, poor accounting of Primary Health Center (PHC)

Correspondence: Prof KM Sabu, Department of Health Information Management, Manipal College of Allied Health Sciences, Manipal University, Manipal- 576104, Karnataka, India. Tel: 0820 2922707 (O), +919845421534 (Mob) E-mail: sabu.km@manipal.edu

expenditures and equitable and objective allocation of funds for PHC are hindering success of the RCH program (Aggarwal, 2004). There is a wide disparity in health status among Indians (Srinivasan, 2009). Similarly, there could be a wide disparity in RCH among Local Government Sector (LGS) even though the key health indicators, such as infant and maternal mortality rates, remain good. A standard system using RCH indicators, can be an effective tool for decision makers. An objective assessment of RCH status at the LGS level could help to improve deficiencies by guiding planning and organization of the RCH program at district and sub-district levels, and help to better utilize health care. This study was carried out to develop and assess a grading system for RCH indicators for LGS.

MATERIALS AND METHODS

Study site

The study was conducted in Udupi District, Karnataka State, India. Udupi is one of the smallest districts for the 29 districts in Karnataka State, with a population density of 290/km². It consists of three administrative divisions: Udupi, Kundapura and Karkala and is comprised of 146 LGS and three municipalities. According to a 2001 census, the population of Udupi District was 1,112, 243, of which 18.6% were an urban population. Udupi has an adult literacy rate of 81%, which is higher than the Indian average (59.5%). Children under age six years constitute 8% of the population. The mean ages of marriage in the district among males and females are 28.5 and 23.3 years, respectively. The district health care network in the public sector is comprised of one district hospital, two smaller hospitals, four community health centers, 51 primary

health centers, nine primary health care units, two mobile tribal units, one mobile ophthalmic unit, one national leprosy control center, one urban leprosy center, one district TB center, one district surveillance center and 320 sub-centers. Udupi is a district in India having excellent health care indicators, comparable to health care indicators of some developed countries.

Study procedure

The data used were standard RCH indicators compiled in forms by PHC and sub-centers from Udupi District. These forms and details about the 14 RCH indicator collected for the year 2006 were obtained from District Health Authority. The data recorded in the forms were scrutinized for completeness and accuracy. A survey was also conducted among 53 senior community medical officers from Udupi District to develop a weight (score) for each RCH indicator. All the community medical officers participating in the survey were educated about the grading system. Based on community level work experience, each medical officer was asked to assign a score for each of the 14 RCH indicators out of a total score of 100 points, considering the importance of each RCH indicator in assessing the health status of people in their area. Based on the individual scores given by respondents, an average score (weight) was given to each RCH indicator. The actual values of the RCH indicators for each LGS weighted as described above were used to provide a RCH grade for each LGS. To ensure uniformity of RCH indicators, all indicators with negative values were used as they were (*eg.* percentage of low birth weight infants in that LGS) and complementary values were used for all RCH indicators with positive measurements (*eg.* instead of the percentage of fully immunized children, the percentage of children not

Table 1
Illustration of scoring system for highest ranked LGS.

| RCH indicators ^a | Observed value | Indicators with positive results | Weight | Weighted score ^b |
|--|----------------|----------------------------------|--------|-----------------------------|
| Infant mortality rate | 0 | NA | 15.7 | 0 |
| Under 5 mortality rate | 0 | NA | 6.3 | 0 |
| Crude birth rate | 10.93 | NA | 4.7 | 51.37 |
| Crude death rate | 5 | NA | 3.9 | 19.5 |
| Maternal mortality rate | 0 | NA | 13.5 | 0 |
| Percentage with low birth weight | 0 | NA | 5.8 | 0 |
| Grades 3 and 4 malnourished children | 0 | NA | 5.8 | 0 |
| Percentage with anemia in pregnancy | 0 | NA | 7.7 | 0 |
| Percentage with total antenatal care | 1,000 | 0 | 6.1 | 0 |
| Percentage with couple protection rate | 837.4 | 162.6 | 5.8 | 943 |
| Percentage of children fully immunized | 980 | 20 | 8.3 | 166 |
| Percentage with institutional delivery | 1,000 | 0 | 6.5 | 0 |
| Percentage with safe delivery | 1,000 | 0 | 6.2 | 0 |
| Sex ratio (0-6 years) | 1,160 | -160 | 3.8 | -609.17 |
| Final score | | | | 570.7 |

^aAll indicators per 1,000 population; ^bobserved RCH value multiplied by RCH weight obtained through survey; NA, not applicable

fully immunized was used). To maintain equivalency in units of measurement, all RCH indicators calculated as percentages were converted to the number per 1,000 population. These scores for each of the RCH indicators for each LGS were then multiplied by their assigned weight based on the community medical officer's survey. The weighted scores for each of the 14 RCH indicators were added to produce an overall RCH score for each LGS. On the basis of this overall RCH score, the 146 LGS and the three municipalities were ranked and graded. Since negative measurements for RCH indicators were used for ranking, the LGS with the lowest overall RCH score had the highest ranking and the LGS with the highest overall RCH score got the lowest ranking. Based on ranks, the LGS were each categorized into one of five grades: LGS ranked from

1 to 25 were classified as a Grade I LGS, those ranked from 26 to 50 were classified as a Grade II LGS, those ranked from 51-75 were classified as a Grade III LGS, those ranked from 76-100 were classified as a Grade IV LGS, and those with a rank >100 were ranked as a Grade V LGS. Illustrations of the scoring methodology for the highest and lowest ranked LGS are shown in Tables 1 and 2, respectively.

RESULTS

The survey of the 53 medical officers showed the infant mortality rate (IMR) should have the highest average weight of 15.7 and the sex ratio (0-6 years) the lowest weight of 3.8 out of 100 points. Table 3 shows the 14 RCH indicators in order of weight. Using this system each LGS received an overall RCH score; the

Table 2
Illustration of scoring system for lowest ranked LGS.

| RCH indicators ^a | Observed value | Indicators with positive results | Weight | Weighted score ^b |
|--|----------------|----------------------------------|--------|-----------------------------|
| Infant mortality rate | 33.33 | NA | 15.7 | 523.28 |
| Under 5 mortality rate | 0 | NA | 6.3 | 0 |
| Crude birth rate | 9.09 | NA | 4.7 | 42.72 |
| Crude death rate | 2.7 | NA | 3.9 | 10.53 |
| Maternal mortality rate | 0 | NA | 13.5 | 0 |
| Percentage of low birth weight | 10 | NA | 5.8 | 582.0 |
| Grades 3 and 4 malnourished children | 0 | NA | 5.8 | 0 |
| Percentage with anemia in pregnancy | 777.8 | NA | 7.7 | 5,989.06 |
| Percentage with total antenatal care | 833.3 | 166.7 | 6.1 | 1,016.9 |
| Percentage with couple protection rate | 762.8 | 237.2 | 5.8 | 1,375.8 |
| Percentage of children fully immunized | 700.0 | 300.0 | 8.3 | 2,490.0 |
| Percentage with institutional delivery | 933.0 | 66.7 | 6.5 | 433.55 |
| Percentage with safe delivery | 933.0 | 66.7 | 6.2 | 413.5 |
| Sex ratio (0-6 years) | 1,015.0 | -15 | 3.8 | -57.15 |
| Final score | | | | 12,820.19 |

^aAll indicators per 1,000 population; ^bobserved RCH value multiplied by RCH weight obtained through survey; NA, not applicable

Table 3
Weighted score derived for RCH indicators based on medical officers' survey.

| RCH indicators | Weighted score ^a |
|--|-----------------------------|
| Infant mortality rate | 15.7 |
| Maternal mortality rate | 13.5 |
| Percentage of children fully immunized | 8.3 |
| Percentage with anemia in pregnancy | 7.7 |
| Percentage with institutional delivery | 6.5 |
| Under 5 mortality rate | 6.3 |
| Grades 3 and 4 malnourished children | 5.8 |
| Percentage with safe delivery | 6.2 |
| Percentage with total antenatal care | 6.1 |
| Percentage with low birth weight | 5.8 |
| Couple protection rate | 5.8 |
| Crude birth rate | 4.7 |
| Crude death rate | 3.9 |
| Sex ratio (0-6 years) | 3.8 |

^a Average score out of 100 points

lowest score was 570.7 and the highest score was 12,820.19. The results show the LGS with the highest grades (Grades I, II and III) were from Udupi Division, and the LGS with the lowest grades (Grades IV and V) were from Kundapura Division. Sixty-three percent of LGS in Udupi Division and 46.6% of LGS in Karkala Division received Grades of I, II or III. The majority (61.4%) of the LGS in Kundapura Division received a Grade of IV or V. Table 4 shows the LGS and their grades.

DISCUSSION

This study appraised a system for evaluating RCH indicators for LGS. There have been no similar studies from India like this previously, but there have been a few studies about development of new indicators and rankings based on selected maternal and child health indicators at

Table 4
Administrative division grading based on RCH indicators.

| Administrative division | GR – I No. (%) | GR – II No. (%) | GR – III No. (%) | GR – IV No. (%) | GR – V No. (%) | Total no. of LGS ^a |
|-------------------------|-------------------|--------------------|---------------------|--------------------|-------------------|----------------------------------|
| Udupi | 14 (22.5) | 13 (20.9) | 12 (19.3) | 13 (20.9) | 10 (16.1) | 62 |
| Kundapura | 6 (10.5) | 6 (10.5) | 10 (17.5) | 6 (10.5) | 29 (50.8) | 57 |
| Karkala | 5 (16.6) | 6 (20.0) | 3 (10.0) | 6 (20.0) | 10 (33.3) | 30 |

^aIncludes 3 municipalities; GR – Grade; GR – I (ranked 1 - 25), GR – II (ranked 26 - 50), GR – III (ranked 51 - 75), GR – IV (ranked 76 - 100), GR – V (ranked 101 and above)

district, state and national levels. A study from Bangladesh evaluated three indicators called fertility infant mortality rate, age adjusted fertility mortality rate and total IMR, by combining family planning and child survival programs. These modified indicators were developed to supplement traditional IMR and total fertility rate indicators (Sack *et al*, 2000). A study from Wisconsin, United States ranked that state against other US states based on IMR, low birth weight and first trimester prenatal care indicators stratified by race (Kvale *et al*, 2004). Generally, comprehensive RCH indicators are not used by health authorities for decision making; but individual RCH indicators are sometimes used. Decisions based on inadequate data may lead to planning and programs that do not adequately meet the needs of the specific population. In developing countries, government authorities need to be more involved in decision making for resource allocation for PHC services to achieve equitability distribution of resources across districts (Okorafor and Thomas, 2007). It is difficult for non-medical person to arrive at decisions based on individual health factors for each LGS. This new grading system developed here can be used as an easy and effective tool to assess and compare RCH

among LGS. Health authorities can look for causes of discrepancy in performance among the different LGS. There can be a wide disparity in performance among LGS even within the same administrative division in a small geographic area. In our study of the 146 LGS, the best performing LGS (Hirgana) with a score of 570.8 and the poorest performing LGS (Nadpal) with a score of 12,820.2 both belonged to the same administrative division.

This new grading system can quickly provide an overall picture of RCH in a population at a specific geographic location, rather than looking at national data regarding only a few specific indicators. In India, some efforts have been made to rank districts using selected socio-demographic and economic factors. In a study by Gokhale *et al* (2002), states were grouped into best, medium and worst based on female literacy levels, the influence of literacy rate on the infant mortality rate and the use of maternal services and vaccination was then determined. A study conducted by the International Institute for Population Science ranked 591 districts of India using a composite index of socio-demographic and economic indicators, including some maternal and child health indicators (Ram and Shekhar, 2006). The study was based on a few RCH

indicators. Rankings were made based on the national results, irrespective of widely varying demographic, socio-economic and cultural factors. In our study, the ranking was based on a comparison of all RCH indicators for a specific population within the same geographic location. Our grading system is a better tool for use at the district and LGS levels.

According to RCH data for Udupi District in 2006, 69 LGS reported no infant deaths and no deaths in children under five years. Of these 69 LGS, 46.4% had either a Grade IV or V due to other poor RCH indicators, indicating child mortality alone is not a good indication of performance. If we consider performance based on only two key indicators, such as infant mortality rate and maternal mortality rate, 84 LGS reported no infant or maternal deaths. Of these 84 LGS, 40.4% received a Grade I or Grade II and 48.8% received a Grade IV or Grade V. The above two scenarios reveal overall health status in a LGS cannot be based on only a few health indicators. All the health indicators play a vital role in determining the overall health of the population. The existing system of health care in India is fraught with many inequities. Current funding is being used sub-optimally and is not directed to maximizing health care. Funding, in India, is largely individual, as opposed to being collective (Chakraborty, 2006). If health care administrators make decisions based on only a few indicators, poor performing health sectors may be neglected during the decision making process, especially when decisions are made by non-medical personnel. Resource allocation is carried out at state or higher levels (Chakraborty, 2006; Srinivasan, 2009). A clear overall picture of the health status of a population is necessary for objective planning and decision making at higher levels.

With our grading system, health authorities can reward the best performing LGS by giving awards. This can develop a healthy competition among LGS, motivating better performance. Publishing the grades given to LGS can bring positive changes. There are no other studies reporting a mathematical approach to grading and comparing LGS based purely on all RCH indicators. Further research in this area can improve comprehensive grading of various other aspects of health care in the community. Different countries can develop their own scoring system for each RCH indicator, depending on their specific region and health requirements. Further studies are needed to assess the appropriate applications of this grading system.

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