Policy Forum

Optimized Reimbursement Scheme of China's New Cooperative Medical System Using Monte Carlo Simulation

MENG Xue Hui[1,2,$], HUANG Yi Xiang[1,$], RAO Dong Ping[3], and LIU Qing[4,#]

China's Rural Cooperative Medical System collapsed alongside communal farming at the end of the Maoist period in 1976, leaving most farmers vulnerable[1]. In rural areas, where 80% of people have been without health insurance of any kind, illness has emerged as a leading cause of poverty[2-4]. To address the poor state of health care among the rural population, in 2003 the Chinese government launched the New Rural Cooperative Medical System (NCMS), an indemnity health insurance program designed to provide health coverage and reduce poverty caused by illnesses for the entire rural population[5-6]. The NCMS expanded dramatically, to cover 832 million people, more than 96% of China's rural population in 2011[7].

With the NCMS expansion and subsidies increasing year by year, the NCMS fund has an excessive balance in most counties, while enrollees obtain only partial financial protection, which may be detrimental to the smooth operation and sustainable development of the NCMS[8-10]. To address this problem, administrators of the NCMS need to adjust the reimbursement scheme continuously, including adjusting deductibles and the reimbursement ratio and ceiling. However, there is no unified scientific measurement method with which to adjust the existing reimbursement scheme in each county. Many studies have focused on how to design and adjust the reimbursement scheme of the NCMS[11-14]. However, most previous studies were limited to simple calculations based on data collection, and lack a comprehensive scientific evaluation and prediction of the implementation effect. Wu Yin-Yin employed a Monte Carlo model to compare the main reimbursement strategies for inpatients and outpatients in the NCMS; however, the study did not design a specific reimbursement scheme[15]. The Monte Carlo method approximates an expected value E(X) by an arithmetic average of the results of a large number of independent experiments that all have the same distribution as X[16]. With powerful computers now more widely available than ever, the Monte Carlo simulation is becoming more popular with quantitative researchers in different disciplines[17]. This simulation technique has been successfully applied to a variety of situations in the medical field[18-21].

It is essential to design and optimize the reimbursement scheme to maintain the fund balance of the NCMS. Using survey data for a county with a large population, we carried out a Monte Carlo simulation to evaluate the effects of proposed specific reimbursement schemes in order to optimize the existing reimbursement scheme scientifically.

The NCMS operates at the county level, and the implementation framework allows local county governments to make adjustments for regional peculiarities[22]. We took Sihui County in Guangdong Province of China, in which 99.98% of rural residents were enrolled in the NCMS, as the sample county in our study. The method of optimizing the reimbursement scheme is also applicable to other counties.

Household Survey The household survey was conducted in all 159 villages of all 13 townships of Sihui County, from March to April 2012. According to the size of each village, 6 to 15 households were randomly sampled using the local-population registration list for each village, producing a sample of 1 179 households consisting of 4 433 rural residents. For these individuals and households, we developed a structured questionnaire to collect detailed information by face-to-face interview. The household survey included modules on the demographics, household income, and use of formal

doi: 10.3967/bes2013.026

1. Department of Health Service Management, Public Health School, Sun Yat-Sen University, Guangzhou 510080, Guangdong, China; 2. Department of Health Service Management, Humanities and Management School, Wenzhou Medical University, Wenzhou 325000, Zhejiang, China; 3. Department of Epidemiology, Baoan Center for Disease Control and Prevention of Shenzhen, Shenzhen 518100, Guangdong, China; 4. Department of Epidemiology, Cancer Center of Sun Yat-Sen University, Guangzhou 510060, Guangdong, China

inpatient medical services over the previous year and outpatient services in the last two weeks, as well as the expenditure and reimbursement of the NCMS for healthcare. We employed EpiData 3.1 software to build datasets and double data entry to ensure the quality of survey data.

All staff members in the survey completed a training workshop. At the training sessions, interviewers were given detailed instructions concerning the administration of the survey questionnaire. The study was approved by the Sihui Health Bureau and Sun Yat Sen University. Written informed consent was obtained from each participant before the data collection. The quality control of the survey addressed the questionnaire design and the implementation of the survey and included a pre-survey for adjusting the questionnaire and a review and verification of the survey and entry data, to ensure the information was accurate and reliable.

Monte Carlo Simulation For observed households, six specific independent variables were set in this study: the number of family members, annual household income level, annual household outpatient expenditure, annual household inpatient expenditure, hospital type for inpatient visits and number of inpatients in the household. Using the survey data, we analyzed the values and distribution characteristics of these variables, as shown in Table 1.

Reviewing the annual statistical report of Sihui NCMS 2011, the following fixed parameters were collected. The actual implementation of deductibles and the reimbursement ratio and ceiling for outpatient and inpatient health services at each type of hospital are listed in Table 2. In Sihui County, the inpatient reimbursement ratio is determined by the hospital level of the inpatient, while the outpatient has the same reimbursement ratio at different hospitals. On these grounds, 14 reimbursement schemes (schemes B to O) were proposed referring to the existing actual reimbursement scheme A in Table 2. The actual reimbursement ratio refers to the total amount of reimbursement over the total healthcare expenditure. In financing, the average financial subsidy per enrollee reached 240 RMB, to which the enrollee was required to contribute 30 RMB in Sihui County in 2011 (1 USD = 6.46 RMB). The poverty line was 2 100 RMB per person per year in Sihui County.

Table 1. Descriptive Statistics for Six Independent Variables of the Sihui NCMS Household Survey

Variables*	Values	Distribution	Parameters
x1: number of family members	1-8	Discrete distribution	*p1*=0.0313, *p2*=0.1289, *p3*=0.2613, *p4*=0.3096, *p5*=0.1900, *p6*=0.0577, *p7*=0.0169, *p8*=0.0043
x2: annual household income level(yuan)$	6 000, 16 500, 37 500, 65 000,90 000,120 000	Discrete distribution	*p1*=0.0958, *p2*=0.4326, *p3*=0.3308, *p4*=0.0517, *p5*=0.0526, *p6*=0.0365
x3: annual household outpatient expenditure (yuan)#	1 500, 2 064, 2 897 ($P_{25,}$ Median, $P_{75,}$ 1 179 households)	Lognormal distribution	log(x3): 3.32±0.22 (Mean±SD)
x4: annual household inpatient expenditure (yuan)	2 500, 5 000, 11 200 ($P_{25,}$ Median, $P_{75,}$ 199 households)	Conditional lognormal distribution	Township health center: log(x4): 3.26±0.37 (Mean±SD); County hospital: log(x4): 3.71±0.44 (Mean±SD); Tertiary hospital: log(x4): 4.02±0.32 (Mean±SD);
x5: hospital type of inpatient	No inpatient household, Township health center, County hospital, Tertiary hospital	Discrete distribution	*p1*=0.8312, *p2*=0.0348, *p3*=0.0831, *p4*=0.0509
x6: number of inpatients in household	0-3	Discrete distribution	*p1*=0.8312, *p2*=0.1578, *p3*=0.0093, *p4*=0.0017

Note. *These variables are independent of each other, except in the case of x4 and x5. We therefore analyzed x4 by x5; $The value is the median at each income level, and the average exchange rate (Yuan per USD) was 6.46 in 2011; #Values are the result of 26 simulations of household outpatient expenditure over two weeks (52 weeks per year).

The six output variables in our study were the average reimbursement ratio for healthcare expenditure (including outpatient and inpatient expenditure), average reimbursement ratio for inpatient expenditure, reimbursement ratio foroutpatient expenditure, fund utilization proportion (FUP, reflecting the utilization proportion of the NCMS fund), percentage decrease in poverty caused by illness (PDPI, reflecting the reimbursement effects of the NCMS fund), and ratio of the PDPI to the FUP (reflecting the efficiency of the NCMS fund). According to the distribution characteristics of independent variables, 10 000 households were sampled in each simulation sampling, and simulation was performed 1 000 times in the present study. The output variables were then compared and analyzed for each scheme as shown in Table 2. The Monte Carlo simulation was performed with editing programs using SAS software, version 9.2 (SAS Institute, Cary, NC, USA) for Windows.

After 1 000 replicating simulations (each consisting of 10 000 households), we obtained 1 000×6 output variables in each scheme; the descriptive results are given in Table 3. The results indicate that the existing implementation scheme A was not the optimal scheme. The NCMS FUP was only 75.30%, and the consequences were a lower average reimbursement ratio for healthcare expenditure (17.63%) and a lower PDPI (25.53%). However, the surplus balance must not exceed 15% according to the national regulations of the NCMS. The efficiency of the NCMS fund can be improved for the same situation. As shown in Table 3, the ratio of the PDPI to the FUP was 36.89% in scheme G, which is more than that (33.94%) in scheme A (the existing implementation) with no increase in financing. The main problem was the surplus balance in the NCMS fund of Sihui County as the results show. To address this, we proposed seven schemes (schemes B to H) in which the reimbursement ratios for outpatients, township health centers, county hospitals and tertiary hospitals were increased, and then proposed seven alternative schemes (schemes I to O) to optimize the existing reimbursement scheme on the basis of the simulation results for schemes B to F.

Table 2. Existing and Proposed Reimbursement Schemes for Sihui's NCMS

Schemes	Outpatient	Township Health Center			County Hospital			Tertiary Hospital		
		Deductibles	Ratio	Ceiling	Deductibles	Ratio	Ceiling	Deductibles	Ratio	Ceiling
A*	0.09	200	0.51	80 000	800	0.41	80 000	1 500	0.26	80 000
B	0.15	200	0.51	80 000	800	0.41	80 000	1 500	0.26	80 000
C	0.20	200	0.51	80 000	800	0.41	80 000	1 500	0.26	80 000
D	0.09	300	0.60	60 000	800	0.41	80 000	1 500	0.26	80 000
E	0.09	300	0.70	60 000	800	0.41	80 000	1 500	0.26	80 000
F	0.09	300	0.80	60 000	800	0.41	80 000	1 500	0.26	80 000
G	0.09	200	0.51	80 000	1 000	0.70	60 000	1 500	0.26	80 000
H	0.09	200	0.51	70 000	800	0.41	80 000	1 200	0.55	60 000
I	0.10	500	0.70	70 000	1 000	0.65	60 000	1 500	0.35	70 000
J	0.10	300	0.70	60 000	1 000	0.60	70 000	1 200	0.45	80 000
K	0.10	300	0.70	60 000	1 200	0.65	80 000	1 500	0.45	90 000
L	0.10	300	0.70	60 000	1 000	0.65	70 000	1 200	0.60	80 000
M	0.10	300	0.75	50 000	1 000	0.70	60 000	1 200	0.65	70 000
N	0.20	300	0.80	50 000	1 000	0.70	60 000	1 200	0.60	70 000
O	0.20	300	0.80	60 000	800	0.75	70 000	1 200	0.70	80 000

Note. *The existing actual implementation of reimbursement scheme in 2011.

Table 3. Results for 1 000 Simulations of Each Scheme for Sihui's NCMS (Mean±SD)

Schemes	Reimbursement Ratio for Healthcare	Reimbursement Ratio for Inpatient	Reimbursement Ratio for Outpatient	Fund Utilization Proportion (FUP)	Decreased Percentages of Poverty (DPPI)	Ratio of DPPI and FUP
A*	0.176 3±0.002 5	0.311 0±0.003 1	0.09	0.753 0±0.021 2	0.255 3±0.018 9	0.339 4±0.027 7
B	0.212 9±0.002 0	0.311 0±0.003 1	0.15	0.909 8±0.020 9	0.295 7±0.019 5	0.325 2±0.023 0
C	0.243 3±0.001 7	0.311 0±0.003 2	0.20	1.038 8±0.021 8	0.329 1±0.019 9	0.317 0±0.020 8
D	0.177 7±0.002 5	0.314 5±0.003 3	0.09	0.758 6±0.021 0	0.257 4±0.017 2	0.339 6±0.024 9
E	0.179 7±0.002 5	0.319 9±0.003 5	0.09	0.766 7±0.021 3	0.261 0±0.018 7	0.340 7±0.026 5
F	0.181 8±0.002 6	0.325 2±0.003 7	0.09	0.776 3±0.021 8	0.262 4±0.019 0	0.338 3±0.026 2
G	0.221 8±0.004 6	0.427 4±0.008 5	0.09	0.947 0±0.030 8	0.349 0±0.020 2	0.368 9±0.023 6
H	0.224 4±0.003 5	0.434 2±0.002 8	0.09	0.958 0±0.028 7	0.343 0±0.019 9	0.358 4±0.024 0
I	0.235 8±0.004 1	0.448 2±0.005 7	0.10	1.006 0±0.031 0	0.366 3±0.020 6	0.364 4±0.023 1
J	0.246 9±0.003 9	0.476 4±0.003 7	0.10	1.053 8±0.031 9	0.380 6±0.020 9	0.361 5±0.022 4
K	0.250 6±0.004 1	0.485 4±0.004 4	0.10	1.070 6±0.033 1	0.389 1±0.020 6	0.363 8±0.022 4
L	0.279 4±0.004 4	0.559 4±0.003 3	0.10	1.193 6±0.036 0	0.449 2±0.020 7	0.376 7±0.021 3
M	0.296 6±0.004 8	0.603 5±0.003 3	0.10	1.267 1±0.038 8	0.489 7±0.020 6	0.386 8±0.020 1
N	0.350 5±0.003 9	0.585 5±0.003 5	0.20	1.496 3±0.037 1	0.538 9±0.021 0	0.360 4±0.016 9
O	0.377 9±0.004 5	0.655 6±0.003 7	0.20	1.612 9±0.042 0	0.601 0±0.019 9	0.372 9±0.015 4

Note. *The existing actual implementation of the reimbursement scheme in 2011.

The simulation results for schemes B and C indicate that there was no improvement in the efficiency of the NCMS fund (from 32.52% to 31.70%) when only increasing the reimbursement ratio for outpatients although the PDPI improved from 29.57% to 32.91%. This illustrates that outpatient expenditure was not the major cause of poverty. In the results for schemes D to F, the efficiency of the NCMS fund was best (34.07%) when the reimbursement ratio for the township health centers was 0.7. This indicates that a reimbursement ratio for township health centers of 0.7 was appropriate. A previous study indicated that the reimbursement ratio should not exceed 0.8 to avoid excessive medical treatment[23]. Therefore, we have not proposed any scheme in which the reimbursement ratio exceeds 0.8. Schemes G and H increased the reimbursement ratios for county hospitals and tertiary hospitals, respectively, and we found that when the reimbursement ratios reached 0.7 and 0.55, respectively, the NCMS fund was almost fully utilized (94.70% and 95.80% respectively). This indicates that the reimbursement ratios for county and tertiary hospitals cannot exceed 0.7 and 0.55 respectively without increased financing for county and tertiary hospitals.

In the seven proposed schemes I to O, the simulation results show that the PDPI improved from 36.63% to 60.10% as the finance increased from 0.60% to 61.29%, while the efficiency of the fund did not follow the same trend. The results for scheme I indicate that the existing scheme A could be improved for all output variables, with the average reimbursement ratio for healthcare expenditure rising from 17.63% to 23.58%, the average reimbursement ratio for inpatient expenditure rising from 31.10% to 44.82%, the PDPI rising from 25.53% to 36.63% and the ratio of the PDPI to the FUP rising from 33.94% to 36.44%, with almost no increase in financing. For an increase in the financial subsidy in the NCMS, this study proposed schemes J to O. When the financing subsidy increased by about 60%, there was a 60.10% in poverty in the case of scheme O.

In recent years, the Chinese government has increasingly focused on reducing financial barriers to access essential care for the rural population[24]. In 2003, China's central government launched one of the largest public-sector health insurance programs

in the world: the NCMS. The NCMS has improved the healthcare utilization of rural residents, who have been reported to be highly satisfied[25-27]. However, problems with the NCMS have gradually emerged in recent years, especially in terms of NCMS fund management. The reimbursement scheme is the core element for NCMS sustainability. Many researchers have focused on designing and adjusting the reimbursement scheme of the NCMS[11-14,28].

The present study performed a Monte Carlo simulation, which is a sophisticated statistical simulation technique that has been widely applied in different disciplines to optimize reimbursement schemes, and to evaluate the effects of reimbursement schemes. The main idea behind the Monte Carlo simulation is to make use of random samples of parameters or inputs to study the behavior of complex systems or processes that involve uncertainty. In situations when theoretical assumptions of a statistical theory may not hold or when statistical theory is weak or nonexistent, Monte Carlo simulation may be the only viable approach for researchers to obtain quantitative answers to a variety of questions[17]. The problem addressed in this study was how to design an appropriate reimbursement scheme for local government in the above situation in which the distribution characteristics of input variables were known, while the distribution characteristics of output variables were unknown; in other words, statistical theories were nonexistent.

The main problem with the NCMS in Sihui County, as the results show, was the NCMS fund surplus balance, which weakened the supply capacity of the NCMS. Meanwhile, the total reimbursement ratio for healthcare expenditure was very low, at only 17.63%. The low level of the reimbursement ratio led farmers to think that the NCMS could not provide the most needed medical insurance and that enrolling in the NCMS was uneconomical, reducing the attractiveness of the NCMS to rural residents[29]. The simulation result shows that the NCMS fund balanced at a reimbursement ratio of about 25%, which was very close to the actual result (21% according to the annual statistical report of Sihui NCMS 2011). The main reason for the difference between simulated and actual ratios was that some enrollees did not go to the administrative department of NCMS for reimbursement owing to the low expenditure and the cumbersome procedures. However, the small difference indicates that the results of Monte Carlo simulation in this study were accurate. The purpose of the actual reimbursement scheme, in which the reimbursement ratio differs according to the hospital level, was to guide enrollees to lower-level hospitals and thus reduce healthcare expenditure. The incentives to use lower-level hospitals may be related to the problematic gatekeeper role of primary care in China. Although the public lack confidence in the quality of primary care in China[30], patients will often go directly to large hospitals instead of having a primary-care consultation first.

In this study, we proposed 14 reimbursement schemes and simulated the effects of implementation using the results of a household survey. The results show that increasing the reimbursement ratio for outpatients did not improve the efficiency of limited funds, and increasing the reimbursement ratio for township health centers did not improve the PDPI, compared with the performance of the existing reimbursement scheme. When increasing the reimbursement ratio for county and tertiary hospitals, the percentage decrease in poverty may rapidly improve. Therefore, with the government's limited funds in the NCMS, Sihui County can increase the reimbursement ratio for serious diseases at county and tertiary hospitals to improve the percentage decrease in poverty and efficiency of funds. In the long term, given an increase in the government subsidy in the NCMS, it is necessary to increase the reimbursement ratio for outpatient services, especially for patients with chronic conditions. Increasing only the reimbursement ratio for inpatient services would crowd out outpatient services, and the unbalanced growth in inpatient and outpatient services would be even more intensified[31-32].

There are a few limitations to our study. The data of annual household outpatient expenditures were not derived from the survey directly but obtained by simulation of outpatient expenditures in the last two weeks. However, this does not affect the application of the Monte Carlo simulation to the NCMS, and with the development of electronic health records for rural residents, the data of healthcare expenditures will be more accurate. In addition, there were only 199 households for inpatient expenditures, and the sample size thus needs to increase to obtain parameters that are more accurate in future research.

In summary, the present study applied the Monte Carlo simulation method to optimize the reimbursement scheme of the NCMS using a

sampling household survey. The results indicate that Sihui County should increase the actual reimbursement ratio for county and tertiary hospitals to improve the existing implementation scheme, and the government should increase its financial subsidy in the NCMS to increase the actual reimbursement ratio for outpatient and inpatient expenditures and thus protect rural households from poverty caused by illness. This study provides future researchers with a scientific approach-a computational algorithm method-to optimize the reimbursement scheme of the NCMS.

[#]Correspondence should be addressed to LIU Qing, Professor, PhD, Tel: 86-20-87345680, Fax: 86-20-87343392. E-mail: liuqingsysu@aliyun.com

[$]MENG Xue Hui and HUANG Yi Xiang contributed equally to this work.

Biographical notes of the first authors: MENG Xue Hui, male, born in 1982, PhD, majoring in health service management; HUANG Yi Xiang, male, born in 1973, PhD, majoring in health service management.

Received: January 26, 2013;
Accepted: May 30, 2013

REFERENCES

1. Babiarz KS, Miller G, Yi H, et al. New evidence on the impact of China's New Rural Cooperative Medical Scheme and its implications for rural primary healthcare: multivariate difference-in-difference analysis. BMJ, 2010; 341, c5617.
2. Wagstaff A, Lindelow M, Jun G, et al. Extending health insurance to the rural population: an impact evaluation of China's new cooperative medical scheme. J Health Econ, 2009; 28, 1-19.
3. Brown PH and Theoharides C. Health-seeking behavior and hospital choice in China's New Cooperative Medical System. Health Econ, 2009; 18, S47-S64.
4. Sun X, Jackson S, Carmichael G, et al. Catastrophic medical payment and financial protection in rural China: evidence from the New Cooperative Medical Scheme in Shandong Province. Health Econ, 2009; 18, 103-19.
5. Babiarz KS, Miller G, Yi H, et al. China's new cooperative medical scheme improved finances of township health centers but not the number of patients served. Health Aff, 2012; 31, 1065-74.
6. Yi H, Zhang L, Singer K, et al. Health insurance and catastrophic illness: a report on the New Cooperative Medical System in rural China. Health Econ, 2009; 18, S119-S127.
7. Liang X, Guo H, Jin C, et al. The effect of new cooperative medical scheme on health outcomes and alleviating catastrophic health expenditure in China: a systematic review. Plos One, 2012; 7, e40850.
8. Zhang L, Cheng X, Liu X, et al. Balancing the funds in the New Cooperative Medical Scheme in rural China: determinants and influencing factors in two provinces. The International journal of health planning and management, 2010; 25, 96-118.
9. Zhou J and Shen R. Study on excessive balances risk of new rural cooperative medical fund. Paper presented at: Information Technology in Medicine and Education (ITME), 2012 International Symposium on 2012.
10. Hu SL. Financing and operational status of New-Type Rural Cooperative Medical System in China. Chinese Health Economics, 2004; 23, 24-5. (In Chinese)
11. Mao Y, Wang H, Xu YZ, et al. Construction the reimbursement ratio calculation model and Application for outpatient in the New Rural Cooperative Medical System. ChineseJournal of Health Sstatistics, 2010; 3, 291-2. (In Chinese)
12. Xia YQ, Jing XL, and Wang HY. The thought in the design of the compensation after increasing t he financing of New Rural Cooperative Medical Scheme. Chinese Journal of Health Policy, 2010; 6, 44-8. (In Chinese)
13. Zhang S, Li XH, Zhang J, et al. Designing for the reimbursement scheme of the New Rural Cooperative Medical System in Huanan Province. Chinese Journal of Health Sstatistics, 2011; 28, 546-7. (In Chinese)
14. Wenjie J and Shaorong S. Research on Calculating Methods of the Reimbursement Ratio, The Threshold and the Top for Compensation of China's New Rural Cooperative Medical System. International Conference on E-Business and E-Government, 2010, 5231-4.
15. Wu YY, Ye Z, He HQ, et al. Application of Monte Carlo Techniques in designing compensatory scheme of New Cooperative Medical System. Chin J Epidemiol, 2009; 30, 290-3. (In Chinese)
16. Korn R, Korn E, and Kroisandt G. Monte Carlo methods and models in finance and insurance. CRC Press/Taylor & Francis, 2010; p55.
17. Fan X. SAS for Monte Carlo studies: A guide for quantitative researchers. Sas Inst, 2003; p 4-5.
18. Anderson K, Jacobson JS, Heitjan DF, et al. Cost-effectiveness of preventive strategies for women with a BRCA1 or a BRCA2 mutation. Annals of internal medicine, 2006; 144, 397.
19. Kaskel P, Tuschy S, Wagner A, et al. Economic evaluation of caspofungin vs liposomal amphotericin B for empirical therapy of suspected systemic fungal infection in the German hospital setting. Annals of hematology, 2008; 8, 311-9.
20. Beggs CB, Shepherd SJ, and Kerr KG. Potential for airborne transmission of infection in the waiting areas of healthcare premises: stochastic analysis using a Monte Carlo model. BMC infectious diseases, 2010; 10, 247.
21. Land TG, Landau AS, Manning SE, et al. Who underreports smoking on birth records: a Monte Carlo predictive model with validation. Plos One, 2012; 7, e34853.
22. Chen L, Haan A, Zhang X, et al. Addressing vulnerability in an emerging economy: China's New Cooperative Medical Scheme (NCMS). Canadian Journal of Development Studies/Revue canadienne d'études du développement, 2011; 32, 399-413.
23. Li LJ, Yang SQ, and Liu GJ. Preliminary study on insurance factor. Chinese Health Service Management, 1994; 6, 295-9. (In Chinese)
24. Huang K, Tao F, Bogg L, et al. Impact of alternative

reimbursement strategies in the new cooperative medical scheme on caesarean delivery rates: a mixed-method study in rural China. Bmc Health Serv Res, 2012; 12, 217.
25. Dai B, Zhou J, Mei YJ, et al. Can the New Cooperative Medical Scheme promote rural elders' access to health-care services? Geriatr Gerontol Int, 2011; 11, 239-45.
26. You X and Kobayashi Y. The new cooperative medical scheme in China. Health Policy, 2009; 91, 1-9.
27. Liu J, Xu L, Cao X, et al. Analysis of satisfaction about new cooperative medical scheme and its influencing factors in Weihai, China. Health Policy, 2008; 86, 239-44.
28. Ma Y, Zhang L, and Chen Q. China's new cooperative medical scheme for rural residents: popularity of broad coverage poses challenges for costs. Health Aff, 2012; 31, 1058-64.
29. Jin F and Zhenzhen L. Risk Management Options for Health Care in Rural China. Economic Research Journal, 2009; 4, 103-15. (In Chinese)
30. Lu L, Xing ZW, Jun Z, et al. Reform of primary care in China. The Lancet, 2005; 366, 120.
31. Yu B, Meng Q, Collins C, et al. How does the New Cooperative Medical Scheme influence health service utilization? A study in two provinces in rural China. Bmc Health Serv Res, 2010; 10, 116.
32. Zhoua Z, Sub Y, Gaoa J, et al. New estimates of elasticity of demand for healthcare in rural China. Health Policy, 2011; 103, 255-65.

Corrections

The authors of “Hypobaric-hypoxia Induces Alteration in Microbes and Microbes-associated Enzyme Profile in Rat Colonic Samples” on page 869 of Vol.26, No.10, 2013 should be corrected as Chiranjit MAITY[1], Pallavi LAHIRI[2], Atanu ADAK[2], Kuntal GHOSH[1], Bikas R PATI[1], and Keshab C MONDAL[1,#]

The second author of “Diurnal Temperature Range and Daily Emergency Room Admissions among the Elderly in Beijing, China” on page 857 of Vol.26, No.10, 2013 should be corrected as ZHENG Shan[2,$,#]