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Original Article

Temporal availability of obstetrics and gynecology clinics in Taiwan: A nationwide survey

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ABSTRACT

Objective: Obstetrician–gynecologists are the main providers of women's healthcare. However, work-force shortages and excessive workloads among these providers have been encountered in many countries. While most past studies on this subject have investigated the spatial distribution of obstetrics–gynecology clinics, few have focused on their temporal availability, especially on the national level.

Materials and methods: The weekly opening time schedules (divided into morning, afternoon, and evening sessions) of all obstetrics–gynecology clinics in Taiwan were extracted from the web site of Taiwan's National Health Insurance Administration in July 2015. The numbers of open sessions were then analyzed and stratified by urbanization level and practice type.

Results: Among 742 obstetrics–gynecology clinics in Taiwan, 521 were located in urban areas, 194 in suburban areas, and 27 in rural areas. The numbers of open sessions per week in suburban areas were higher than those in urban and rural areas (16.7 ± 2.6 vs. 15.9 ± 3.1 and 15.9 ± 2.7). Group practices had more open sessions per week than solo practices (16.8 ± 2.8 vs. 15.8 ± 3.0). With respect to after-hours services in rural areas, only two rural obstetrics–gynecology clinics remained open on Sunday mornings, while none remained open on Sunday afternoons and evenings.

Conclusion: Obstetrics–gynecology clinics in Taiwan offered great temporal availability. In addition to the remarkable urban–rural disparity in the distribution of obstetrics–gynecology clinics, the availability of services on Sundays in rural areas demands special attention.

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Introduction

Obstetrician–gynecologists are the main providers of women's healthcare, including care for pregnant women, child delivery services, and the treatment of gynecological diseases and cancer. Moreover, obstetrician–gynecologists are also playing an increasingly important role in providing primary care for women [1–3], especially in rural areas [4]. The ambulatory care provided by obstetrician–gynecologists might include disease prevention and health education [5] and could thus lead to fewer hospitalizations

and shorter hospital stays [6]. While most of the related literature has discussed the shortage of obstetrician–gynecologists [7–10] and the increased workloads of obstetrician–gynecologists with obstetric practices [11,12], studies regarding the temporal availability of ambulatory healthcare for women on the national level remain scarce.

The aim of the current study was to analyze the opening time schedules of all obstetrics–gynecology (OB/GYN) clinics listed by the web site of the National Health Insurance (NHI) Administration in Taiwan. Moreover, we stratified that data by urbanization level and practice type (solo or group practice). The resulting nationwide analysis might provide evidence-based information that would be of relevance to healthcare policy makers.

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Materials and methods

Ethics statement

According to Taiwan's personal data privacy legislation and the regulations of the institutional review board (IRB) at Taipei Veterans General Hospital (Taipei, Taiwan), the utilization of publicly available data is exempt from the IRB approval procedure.

Study design and data extraction

In the current study, we extracted the complete lists of contracted healthcare facilities (2976_1_hospbsc.zip), service items of the healthcare facilities (2978_1_service.zip), and the specialties in the healthcare facilities (2980_1_detafunc.zip) from the NHI web site [13]. We identified 984 OB/GYN clinics in these lists, but excluded 240 clinics which had terminated their contracts prior to July 2015. We also excluded two other listed OB/GYN clinics because there were no opening time schedules for those clinics shown on the NHI web site. Finally, a total of 742 OB/GYN clinics were included in the current study.

The opening time schedules of each these OB/GYN clinics, all of which were posted on the NHI web site, were divided into three sessions (morning, afternoon, and evening) for each day of the week. We retrieved the opening time schedules of the 742 OB/GYN clinics from the web site using a programming script. These data were extracted for further analysis. Furthermore, we used another programming script to obtain basic data for 368 townships in Taiwan, including the female population of each town, from the Monthly Bulletin of Interior Statistics published by the Ministry of the Interior [14].

The 368 towns were classified into urban, suburban, and rural areas according to the definition of 7-level urbanization published by Taiwan's National Health Research Institutes [15]. The seven levels were determined by the following variables: population density, population ratio of people with college educational levels, population ratio of elderly people over 65 years old, population ratio of agricultural workers, and the number of physicians per 100,000 people. We categorized levels 1–2 as urban areas, levels 3–4 as suburban areas, and the other levels as rural areas. Two isolated islands, Kingmen and Lienchiang, which were not included in the 7-level urbanization and are located at remote distances from the main island of Taiwan, were categorized as rural areas.

We analyzed the numbers of open sessions in a week for all the OB/GYN clinics, and compared the differences in open sessions for the three areas and distinct practice types (solo and group practices). For after-hours services, we also compared the open ratios on

weekday evenings, Saturdays, and Sundays, for the different urbanization areas.

Statistical analysis

We retrieved and extracted data from the web site using the open-source Perl software (version 5.20.1) (<https://www.perl.org/>). The descriptive statistics were analyzed in Microsoft Excel 2013. Moreover, the Mann–Whitney U test in the SPSS, version 22, software was used for comparing the numbers of open sessions among the urban, suburban, and rural areas, and among the different practice types (solo versus group practices). A *p*-value <0.05 (two-tailed) was considered statistically significant.

Results

Among the 742 OB/GYN clinics, although the overwhelming majority were located in urban and suburban areas (70.2% and 26.1%, respectively), the minority, on average, cared the most female population per clinic (Table 1). About 67.9% OB/GYN clinics were solo practices (Fig. 1). However, OB/GYN clinics with group practices provided significantly more open sessions per week than those with solo practices (16.8 ± 2.8 vs. 15.8 ± 3.0 , $p < 0.001$) (Fig. 1).

Overall, the mean number of open sessions that OB/GYN clinics provided in a week was 16.1 (SD = 3.0). While the number of open sessions in a week was statistically larger in suburban areas than urban areas (16.7 ± 2.6 vs. 15.9 ± 3.1 , $p = 0.001$), there was no significant difference between urban and rural areas (15.9 ± 3.1 vs. 15.9 ± 2.7 , $p = 0.876$) or suburban and rural areas (16.7 ± 2.6 vs. 15.9 ± 2.7 , $p = 0.128$) (Fig. 2).

During the daytime on weekdays (morning and afternoon), the open ratios were highest in rural areas (average 99.6%), and then decreased gradually from suburban (average 95.0%) to urban (average 89.6%) areas (Table 2). As to after-hours services, generally speaking, the open ratios in rural areas were lower than those in urban and suburban areas (Fig. 3). Comparing the number of after-hours open sessions, OB/GYN clinics in suburban areas offered more office hours than those in urban areas ($p = 0.029$).

Discussion

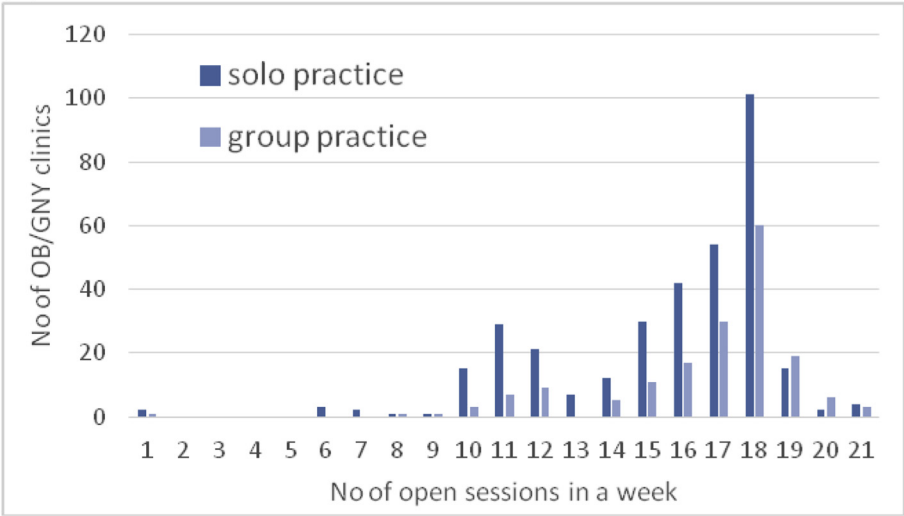
According to a survey of the American Congress of Obstetricians and Gynecologists (ACOG) in 2012, among out-of-hospital obstetrician–gynecologists, about one half practiced in suburban areas (45.9%) and 70% practiced in group practices [16]. In contrast with those ACOG survey results, the results of this study indicate that most of the OB/GYN clinics in Taiwan were solo practices (about

Table 1
Distribution of obstetrics–gynecology (OB/GYN) clinics in Taiwan, July 2015.^a

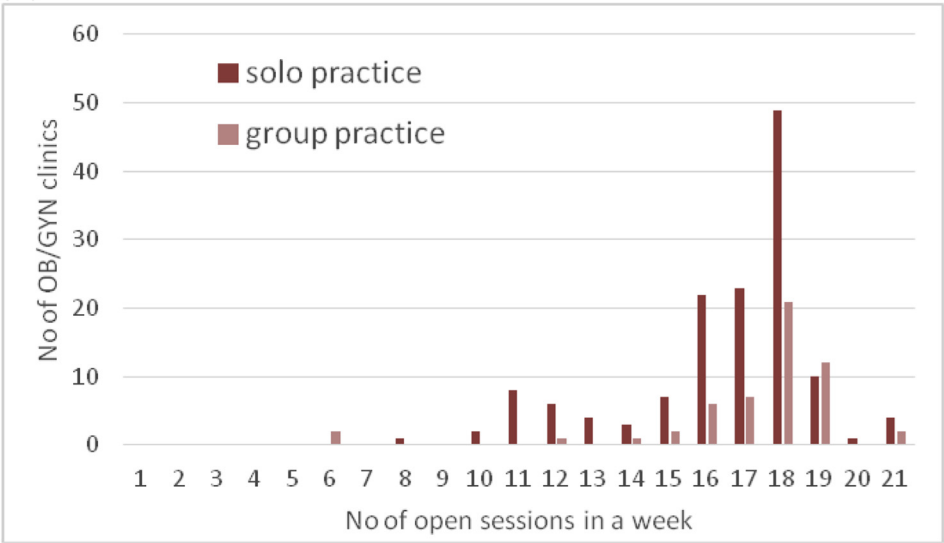
Urbanization area	No of towns	Female population ^a	Area (km ²) ^a	Female population density (people/km ²) ^a	No of OB/GYN clinics (%)	Average population cared by a clinic (people/clinic)
Urban	69	6,279,038	1990.9	3149.8	521 (70.2)	12,051.9
1	27	2,671,439	331.4	7991.1	241	11,084.8
2	42	3,607,599	1659.5	2174.3	280	12,884.3
Suburban	144	4,221,233	8418.8	501.5	194 (26.1)	21,758.9
3	57	2,478,912	2477.6	1001.1	95	26,093.8
4	87	1,742,321	5941.2	293.3	99	17,599.2
Rural	155	1,235,511	25,780.2	47.9	27 (3.6)	45,759.7
5	35	233,266	2766.0	84.3	4	58,316.5
6	61	459,353	11,849.9	38.8	8	57,419.1
7	49	473,850	10,983.8	43.1	14	33,846.4
Remote isles	10	69,042	180.5	382.5	1	69,042
Total	368	11,735,782	36,189.9	—	742	—

^a Calculated from the basic data for 368 towns published by the Department of Statistics, Ministry of the Interior, of the Taiwan government [14].

(A) Urban areas



(B) Suburban areas



(C) Rural areas

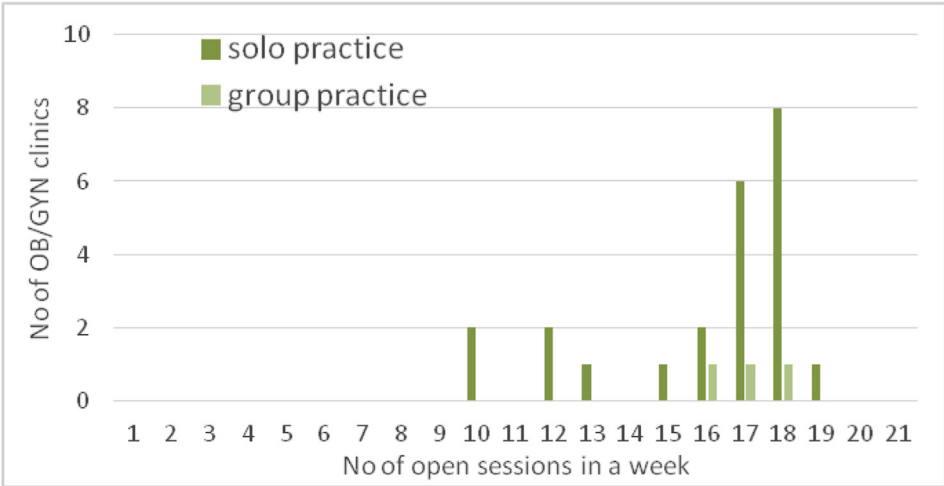


Fig. 1. Numbers of open sessions of obstetrics–gynecology (OB/GYN) clinics for solo and group practices in different urbanization areas.

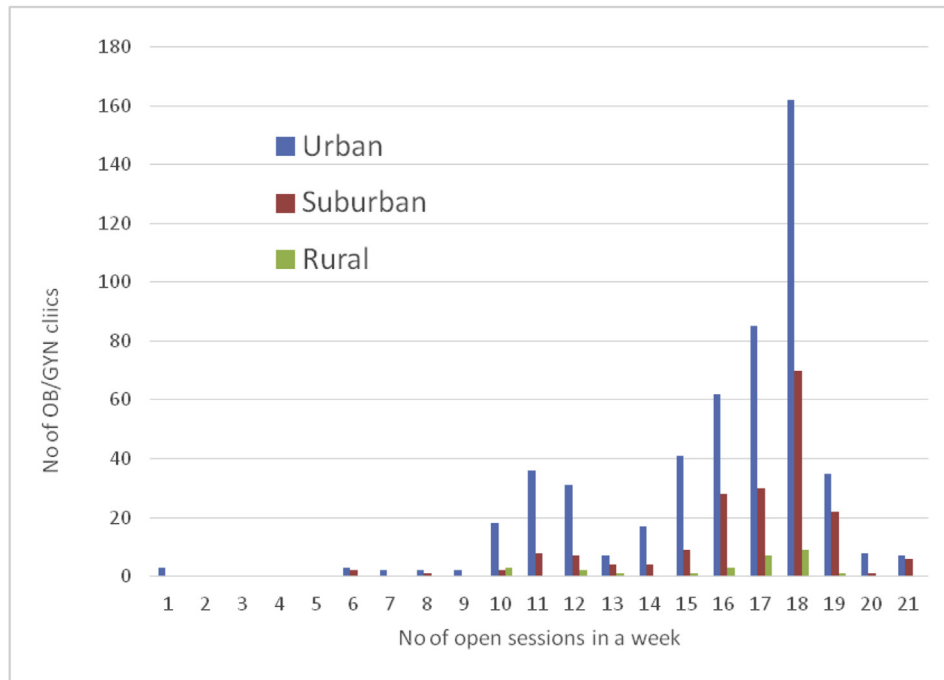


Fig. 2. Distribution of open sessions of obstetrics–gynecology (OB/GYN) clinics.

Table 2

Numbers of obstetrics–gynecology clinics with office hours, stratified by urbanization level, session, and day of week.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Urban, n = 521 (%)							
Morning	491 (94.2)	482 (92.5)	486 (93.3)	478 (91.7)	489 (93.9)	486 (93.3)	61 (11.7)
Afternoon	459 (88.1)	456 (87.5)	431 (82.7)	440 (84.5)	454 (87.1)	359 (68.9)	20 (3.8)
Evening	494 (94.8)	484 (92.9)	468 (89.8)	480 (92.1)	488 (93.7)	266 (51.1)	14 (2.7)
Suburban, n = 194 (%)							
Morning	191 (98.5)	192 (99.0)	188 (96.9)	189 (97.4)	189 (97.4)	186 (95.9)	41 (21.1)
Afternoon	185 (95.4)	178 (91.8)	175 (90.2)	172 (88.7)	183 (94.3)	144 (74.2)	6 (3.1)
Evening	180 (92.8)	184 (94.8)	174 (89.7)	180 (92.8)	179 (92.3)	113 (58.2)	8 (4.1)
Rural, n = 27 (%)							
Morning	27 (100)	27 (100)	27 (100)	27 (100)	27 (100)	24 (88.9)	2 (7.4)
Afternoon	27 (100)	27 (100)	26 (96.3)	27 (100)	27 (100)	19 (70.4)	0 (0.0)
Evening	22 (81.5)	21 (77.8)	20 (74.1)	20 (74.1)	21 (77.8)	12 (44.4)	0 (0.0)

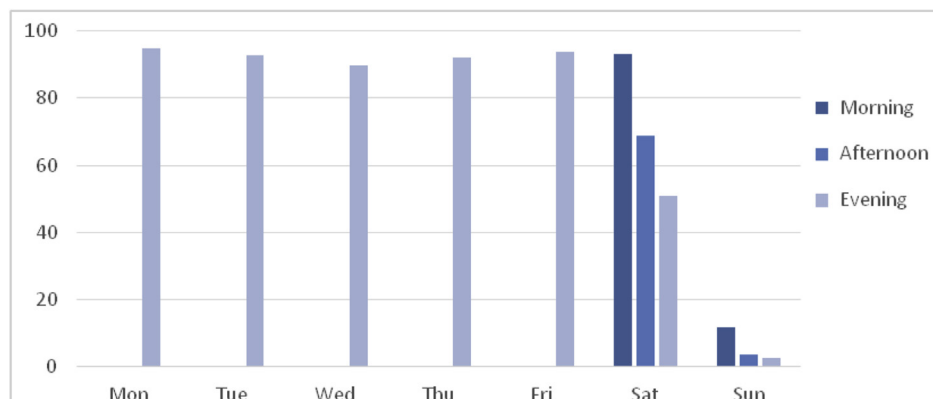
68%) and that most of them were located in urban areas (70.2%). However, the numbers of open sessions and overall opening ratios per week for OB/GYN clinics in urban areas were less than those for OB/GYN clinics in suburban areas. The reason for this situation might be that nearly 90% of urban towns have practicing obstetrician–gynecologists in hospitals, such that the OB/GYN clinics in those areas do not need to offer as many open sessions as those in suburban areas.

In addition to the sparse percentage of OB/GYN clinics (3.6%) located in rural areas, the number of towns without OB/GYN clinics were increasing. There were 213 towns without OB/GYN clinics. Among those towns, there were 21 towns with practicing obstetrician–gynecologists in regional or local hospitals (data not shown). Overall, the number of towns completely without practicing obstetrician–gynecologists increased to 192 in July 2015, compared with the result of 145 towns without practicing obstetrician–gynecologists reported for 2010 [17]. Because of long working hours, high rates of medical disputes and career dissatisfaction, shortages of obstetrician–gynecologists have become a weighty issue throughout the world [7–10,18], and such shortages may get worse in the future [8]. In addition, obstetric practices tend

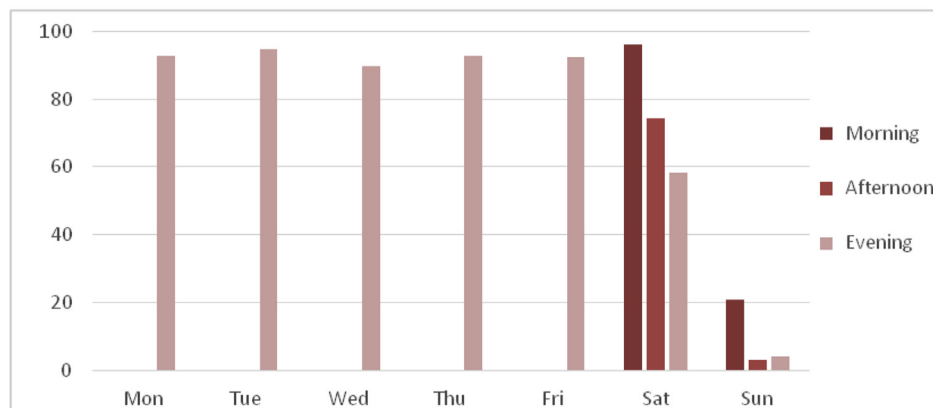
to entail high workloads and decreased levels of personal control [11,12], factors which have been found to influence residents' choices with regard to specialties [11]. The distribution of obstetrician–gynecologists has also been found to show an urban–rural disparity [19]. In addition to the problems mentioned above, Taiwan also faces issues raised by the aging and retiring of existing obstetrician–gynecologists [20–22]. Among all types of specialists in Taiwan, obstetrician–gynecologists were the oldest (53 years old on average) physicians in Taiwan in 2014 [23]. In addition, the obstetrician–gynecologists in Taiwan are older, on average, than the obstetrician–gynecologists in other countries [10].

Although obstetrician–gynecologists working in group practices generally have higher incomes [24], the number of OB/GYN clinics in rural areas with group practices was only three. Moreover, the majority of towns without OB/GYN clinics were located in rural areas (Table 2). According to the previous literature [17], women in towns without practicing obstetrician–gynecologists make fewer visits to OB/GYN clinics than those in towns with practicing obstetrician–gynecologists. Moreover, for general practitioners, working in rural areas causes more stress and greater feelings of being overworked [25], and those factors might also affect the

(A) Urban areas



(B) Suburban areas



(C) Rural areas

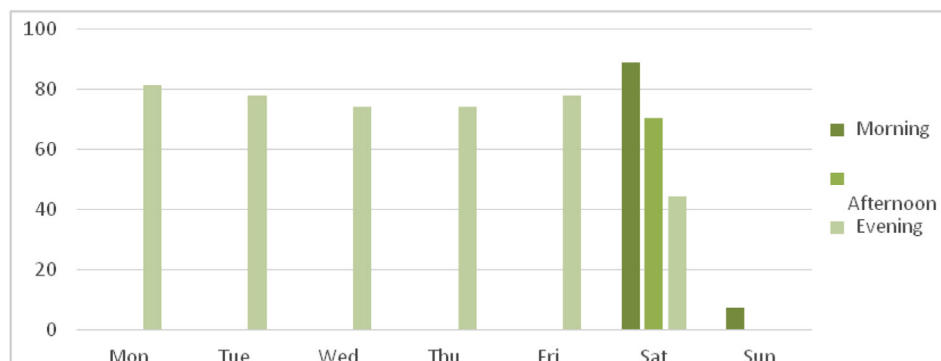


Fig. 3. The availability of after-hours services of obstetrics–gynecology (OB/GNY) clinics in different urbanization areas.

numbers of obstetrician–gynecologists willing to work in rural areas. Therefore, there were fewer obstetrician–gynecologists willing to practice in rural areas or work in group practices (11.1% clinics) in rural areas in Taiwan.

In rural areas, in contrast to the almost 100% open ratio during the daytime on weekdays, the open ratio of OB/GYN clinics dropped for after-hours services, such that rural clinics provided fewer after-hours open sessions than those in urban and suburban areas (Fig. 3). This might be caused by the shortage of obstetrician–gynecologists in rural areas, and might also be related to the

work styles and life styles of residents in cities, e.g. long working hours and unpaid leave [26,27], which could make the OB/GYN clinics in suburban and urban areas willing to provide more after-hours services.

Finally, there were some limitations in our study. Because we identified the OB/GYN clinics according to the registered specialty of obstetrician–gynecologist, we could not distinguish any possible instances of obstetrician–gynecologists providing on-call hours or assistance to other clinics. Therefore, the exact working hours of each obstetrician–gynecologist in the surveyed clinics could not be

calculated. Additionally, we could not differentiate whether the OB/GYN clinics offered either obstetrics services or gynecological services only. As such, the specific influence of obstetrics practices on working hours could not be analyzed [11]. We recommended the NHI in Taiwan or “Taiwan Association of Obstetrics and Gynecology” to investigate such important and helpful information (including which OB/GYN clinic providing 24-h childbirth service, how many physicians on duty roster, and etc.) for further research. In a previous study published in 2015 [28], the age distribution of the female population in different urbanization areas was found to influence OB/GYN visits. However, the age distribution could not be obtained in the current study, so the relationship between the age distribution of the female population and the numbers of open sessions for clinics in different urbanization areas could not be determined.

In conclusion, OB/GYN clinics in Taiwan offered great temporal availability. In addition to the remarkable urban–rural disparity in the distribution of OB/GYN clinics, the availability of services on Sundays in rural areas demands serious attention. New policies are essential to resolve the present circumstances (such as increasing the reimbursement fee for each patient visit, providing sustained incentives to encourage doctors to open clinics in rural area or recruit young obstetrician–gynecologists, etc.).

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

References

- [1] Coleman VH, Power ML, Zinberg S, Schulkin J. Contemporary clinical issues in outpatient obstetrics and gynecology: findings of the collaborative ambulatory research network, 2001–2004: part I. *Obstet Gynecol Surv* 2004;59: 780–6.
- [2] Coleman VH, Power ML, Zinberg S, Schulkin J. Contemporary clinical issues in outpatient obstetrics and gynecology: findings of the collaborative ambulatory research network, 2001–2004: part II. *Obstet Gynecol Surv* 2004;59: 787–94.
- [3] Sanfilippo JS, Smith RP, editors. *Primary care in obstetrics and gynecology: a handbook for clinicians*. 2nd ed. New York: Springer; 1998.
- [4] Baldwin LM, Rosenblatt RA, Schneeweiss R, Lishner DM, Hart LG. Rural and urban physicians: does the content of their Medicare practices differ? *J Rural Health* 1999;15:240–51.
- [5] The American Congress of Obstetricians and Gynecologists. *Obstetrician–gynecologists are primary care providers*. Washington. 2015.
- [6] Hill LD, Erickson K, Holzman GB, Power ML, Schulkin J. Practice trends in outpatient obstetrics and gynecology: findings of the Collaborative Ambulatory Research Network, 1995–2000. *Obstet Gynecol Surv* 2001;56:505–16.
- [7] Hoyle M. Shortage of doctors, shortage of data: a review of the global surgery, obstetrics, and anesthesia workforce literature. *World J Surg* 2014;38:269–80.
- [8] Satiani B, Williams T, Landon M, Ellison C, Gabbe S. A critical deficit of OBGYN surgeons in the US by 2030. *Surg Sci* 2011;2:95–101.
- [9] The Society of Obstetricians and Gynaecologists of Canada. A national birthing initiative for Canada: an inclusive, integrated and comprehensive pan-Canadian framework for sustainable family-centered maternity and newborn care. Ottawa, Ont. 2008. Available from: <http://sogc.org/wp-content/uploads/2012/09/BirthingStrategyVersionJan2008.pdf>. [Accessed 19 May 2016].
- [10] Ide H, Yasunaga H, Kodama T, Koike S, Taketani Y, Imamura T. The dynamics of obstetricians and gynecologists in Japan: a retrospective cohort model using the nationwide survey of physicians data. *J Obstet Gynaecol Res* 2009;4: 761–6.
- [11] Dresden GM, Baldwin LM, Andrilla CH, Skillman SM, Benedetti TJ. Influence of obstetric practice on workload and practice patterns of family physicians and obstetrician–gynecologists. *Ann Fam Med* 2008;6(Suppl. 1):S5–11.
- [12] Bettes BA, Chalas E, Coleman VH, Schulkin J. Heavier workload, less personal control: impact of delivery on obstetrician/gynecologists' career satisfaction. *Am J Obstet Gynecol* 2004;190:851–7.
- [13] National Health Insurance Administration, Ministry of health and welfare. Available from: http://www.nhi.gov.tw/english/index.aspx?menu=8&menu_id=30&webdata_id=0&WD_ID=30. [Accessed 7 July 2015].
- [14] Department of Statistics, Ministry of the interior, Republic of China (Taiwan). Available from: <http://sowf.moi.gov.tw/stat/month/elist.htm>. [Accessed 7 July 2015].
- [15] Liu CY, Hung YT, Chuang YL, Chen YJ, Weng WS, Liu JS, et al. Incorporating development stratification of Taiwan townships into sampling design of large scale health interview survey. *J Health Manag* 2006;4:1–22.
- [16] Klagholz J, Strunk AL. Overview of the 2012 ACOG survey on professional liability. ACOG; 2012. Available from: <https://www.acog.org/-/media/Departments/Professional-Liability/2012PLSurveyNational.pdf>. [Accessed 28 June 2016].
- [17] Lai LJ. No gynecologist in town: the gynecological care of women in rural Taiwan. *Patient Prefer Adherence* 2015;9:1077–83.
- [18] Anderson BL, Hale RW, Salsberg E, Schulkin J. Outlook for the future of the obstetrician–gynecologist workforce. *Am J Obstet Gynecol* 2008;199:88. e1–8.
- [19] [No authors listed]. ACOG committee opinion No. 586: health disparities in rural women. *Obstet Gynecol* 2014;123:384–8.
- [20] Cheng TM. Reflects on the 20th anniversary of Taiwan's single-payer national health insurance system. *Health Aff (Millwood)* 2015;34:502–10.
- [21] Wang PH, Sheu BC, Yeh JY. The sunset industry: obstetrics and gynecology concerns about the shortage of obstetricians and gynecologists. *Am J Obstet Gynecol* 2009;201:e12.
- [22] Taiwan Medical Association. The medical statistics in 2014. [In Chinese] Available from: http://www.tma.tw/tma_stats_2014/index.html. [Accessed 22 Mar 2016].
- [23] Ministry of Health and Welfare. The subsidized program for the residents of specific divisions. 2015. Available from: http://www.mohw.gov.tw/CHT/DOMA/DM1_P.aspx?f_list_no=937&fod_list_no=5790&doc_no=50056. [Accessed 24 May 2016] [In Chinese].
- [24] Lin HC, Chen CS, Liu TC, Lee HC. Differences in practice income between solo and group practice physicians. *Health Policy* 2006;79:296–305.
- [25] Hoffmann K, Wojcowski S, George A, Schäfer WL, Maier M. Stressed and overworked? A cross-sectional study of the working situation of urban and rural general practitioners in Austria in the framework of the QUALICOPC project. *Croat Med J* 2015;56:366–74.
- [26] Kao MH, Furukawa I, Fukuda H. The new trends in urban lifestyle in Taiwan. Research Institute for High-Life. 2012. Available from: http://www.hilife.or.jp/english/the_new_trends_in_asian_urban/. [Accessed 24 May 2016].
- [27] Wang CW, Cheng YW, Hsu JH. The association between precarious employment and health status among employee in Taiwan. *Taiwan J Publ Health* 2011;30:217–27 [In Chinese].
- [28] Lynn AM, Lai LJ, Lin MH, Chen TJ, Hwang SJ, Wang PH. Pattern of ambulatory care visits to obstetrician–gynecologist in Taiwan: a nationwide analysis. *Int J Environ Res Public Health* 2015;12:6832–41.