

Estimating the Monetary Value of Hours Lost to the Nigerian Public Healthcare System When Full-Time Government Employee Doctors Engage in Dual Practice

Bartholomew S. Eze¹, Mari Jones², Imani Silver Kyaruzi³

¹Department of Health Administration and Management, Enugu Campus, University of Nigeria, Enugu, Nigeria

²Swansea Centre for Health Economics, Swansea University, Swansea, UK

³QA Higher Education, Birmingham, UK

Email: Bartholomew.eze@unn.edu.ng, Mari.Jones@swansea.ac.uk, Imani.kyaruzi@qa.com

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Abstract

Background: Dual Practice (DP) allows full-time public sector doctors to concurrently offer the same clinical services in the private sector. The debate against this practice seems to be largely influenced by its potential to reduce the contracted hours in the public sector and shift attention to private work. **Purpose:** The purpose of this secondary research is to estimate the monetary value of hours lost to the Nigerian public healthcare system when full-time government employee doctors are engaged in private practice. It attempts to quantify the amount of resource outflow from the public system due to absences and lateness arising from competition for time between the public system's contracted hours and private practice. **Methods:** Sensitivity analysis in Excel 2010 was used to calculate doctors' hourly pay in the public sector using the 2015 Consolidated Medical Salary Structure for medical and dental officers in Nigeria's federal public service. The parameters used for the calculation were the official 40-hour working week and the average monthly gross pay of doctors on different grade levels. Hypothetical scenarios of hours lost due to absences associated with DP were created. The value of different hypothetical hour losses by the percentage of doctors assumed to engage in dual practice across all doctor grade levels was then computed. **Results:** The estimated annual value of hours lost from dual practice to a single public tertiary care hospital was N4,851,754 or 15,855 USD (best case scenario) and N19,407,017 or 63,422 USD (worst case scenario) for the normal routine work and N1,800,133 or 5883 USD (best case scenario) and N3,600,266 or 11,766 USD (worst case scenario) for the on-call duty. **Conclusion:** The government may have been

paying salaries for large volumes of work not rendered in the public sector. The overall financial impact of dual practice in the Nigerian public system might be negative.

Keywords

Dual Practice, Hours Lost, Nigeria, Private Practice, Public Healthcare, Absences

1. Introduction

Dual Practice (DP) occurs when medical professionals, who have contracts of employment with the public sector, work concurrently in the private sector [1]-[8]. DP occurs among different categories of workers [9], and it is evident in both industrialised [10] and industrializing countries [11]. The engagement of medical professionals in both public and private sector work is increasingly gaining the attention of many governments in developed and developing countries alike [12]. Some authors have suggested that it is in the interest of the government to acknowledge the existence of DP by investigating its potential impact on public service provision [3] [13], whilst ignoring its existence would not prevent the impact on the health system from occurring.

In Nigeria, there is a high growth of private medicine with dual practice officially permitted outside regular shifts. The Code of Medical Practice in Nigeria allows medical and dental surgeons in full-time employment in the public sector to use their off-duty hours to engage in private medical or dental practice for remuneration [14]. The allocated time for private practice in Nigeria starts from 4.00 pm, after the official public-sector work time from 8.00 am to 4.00 pm. The dual practitioner in principle can only resume private work after 4.00 pm if not on call. However, many public-sector doctors have additional income-generating activities [15], whilst many operate a 24-hour private hospital service [16] [17].

The crux of the argument about DP comes down to whether it has positive or negative service delivery or financial consequences for the health system and service users. It has been argued that the consequences associated with DP may differ across different health systems depending on the strength of their regulatory mechanisms, the nature of the medical labour market, and physicians' motivation [18] [19]. For example, there has been much public debate in Denmark about whether the dual practice has stimulated the growth of the private sector, and consequently, the move for the amendment of the Health Act [20]. In that country, this growth is seen as a threat to the running of the public healthcare system.

Doctors who work both in the public and private sectors are faced with a conflict of interest, in the sense that personal gains may not equate with benefits to the public system in which the professionals work. Evidence has shown that absenteeism, late reporting to work, and poor commitment to government work

are common among DP physicians [21] [22] [23], which inevitably reduces the quantity and quality of services offered. Evidence from developed countries is conflicting with regard to whether DP expands or restricts access to health care services. For example, a study that analysed consultants' NHS and private incomes in England found that full-time NHS doctors engaged in private practices invested more time in their private work by exceeding the 10% income threshold from private remuneration [24]. This evidence is congruent with the report of Yate (2000) that public-sector consultant DPs on average set aside two and a half days weekly for private consultations and operations. Similar evidence affirmed a lack of commitment to duties linked to private practice among NHS doctors in the past [25] with some dual practitioners using NHS sick leave to do private work. Despite this obvious negative consequence, some studies have shown that DPs are still as productive as their non-DP counterparts [26] [27].

Previous studies [11] [28] have shown that competition for time between public and private work limits access to healthcare. For example, in Venezuela and Costa Rica, health workers missed their contract service hours by between 37% and 65% respectively [28]. In India, Bangladesh, Indonesia, Peru and Uganda 35%, 40%, 25% and 37% of absenteeism was recorded, respectively, among health workers [22] [29], and in Nigeria, 46.9% of absenteeism was recorded with doctors [30] [31]. Thus, attention and efforts may be concentrated on private work, where there is a higher profit margin. This is supported by [32], who showed that competition for time may result in the transfer of resources out of the public sector through reduced availability, which accounts for a loss of value equivalent to 27% of salary among public health managers in developing countries. Absenteeism by health workers may restrict patients' subsequent visits to a public facility and could lead to seeking an alternative healthcare provider in the private sector. But the question of whether these absences are associated with private practice may need further research to establish.

A study in three African cities shows that the choice of allocation of time in the private sector by dual practitioners depends on a number of factors, such as the number of dependants, whether holding a specialisation and having enough private patients [33]. Some dual physicians may be busier than others, particularly those who specialise in areas not practiced in the public sector. For instance, in Nigeria, *In Vitro* Fertilisation (IVF) treatment is not common in most public hospitals but is gaining popularity in the private sector. A dual practitioner who specialises in IVF treatment may use more government time due to a large private clientele. The same is applicable to obstetrics and gynecology specialists.

This study looked at one aspect of the arguments against DP, and that is the reduction of the contracted hours in the public system due to doctors' engagement with private clinical work. One novel aspect of the research is the use of sensitivity analysis, comparing multiple scenarios, to highlight the value of hours lost to the public system of absences and truancy by DP doctors. A similar large flow of resources out of public healthcare was reported in Macq's study [32] and

a number of other descriptive literature on DP stressing the consequences of the practice in the public system [12] [13] [18]. However, the present analysis goes further by quantifying the value of paid hours lost to the public system in monetary terms and this serves to emphasize the magnitude of the problem that DP represents in Nigeria. Measuring the cost in this way could make a valuable contribution to the policy discourse on DP, particularly in developing countries. This innovative method is a tool that policymakers could use to examine the outflow of financial resources from the public system. By estimating the number of hours lost to absences under different scenarios, the government can then set itself a target to reduce the number of doctors engaged in DP, and over time reduce the number of hours lost and the consequent loss of value in cash terms to the public system.

2. Methods

2.1. Defining the Consolidated Medical Salary Structure in Nigeria

The Consolidated Medical Salary Structure (CONMESS) is a special salary structure approved by the Federal Government of Nigeria for medical and dental officers in the federal public service on grade levels 1 - 7 (CONMESS 1 - 7) by the National Salaries, Income and Wages Commissions (NSIWC) [34]. The Commission is the body in-charge of matters relating to salaries and wages of Nigerian workers, which is reviewed from time to time as the need arises. CONMESS includes the basic or consolidated salary, hazard allowance, which is paid across board to all medical and dental doctors. Teaching allowance is paid to medical and dental officers who engage in teaching of medical students or other healthcare professionals in training in federal tertiary hospitals. Rural posting allowance goes to medical and dental officers who accepted posting in rural communities whilst specialist allowance is allocated to those employed as consultants. The version of the Consolidated Medical Salary Structure used in this study took effect from January 2015 and was obtained from the Finance Department of a federal teaching hospital used in this study. All federal government tertiary hospitals use this salary structure to pay their medical and dental officers in Nigeria. The clinical duty allowance for honorary consultants was not included in the calculation because this category of consultants is not on full-time contract with federal teaching hospitals but with universities offering medical training and only receives allowances from teaching hospitals.

2.2. Methods for Analysing the Value of Hours Lost

Sensitivity analysis was performed in Excel 2010 Spreadsheet to calculate the doctor's hourly pay in the public sector (**Table 1**) for a normal routine hour. The hourly pay helped the researcher to estimate the magnitude of the value of hours lost to dual practice due to absences from government work. First, different hypothetical scenarios were created to estimate hours lost per week. These hypothetical scenarios reflect the evidence on the decline of quality care in the public

Table 1. CONMESS for normal duty allowances and computation of hourly pay value for doctors on grade levels 1 - 7.

Grade/ Levels	Steps	1	2	3	4	5	6	7	8	9	10	11	*AV monthly salary	**Hourly pay value (Naira)
1	Consolidated	109707.33												
	Hazard	5000												
	Teaching allowance	9371											133450.33/1 step	890 per hour
	Rural posting	9371											***HP = 133450/150	
	Total	133449.33												
2	Consolidated	130215.52	133409.75	136604	139798	142992.4	146186.67	149381	152575.1	155769.35	158963.58	162157.84		
	Hazard	5000	5000	500	5000	5000	5000	5000	5000	5000	5000	5000	AV = 1932895/11 steps	1171 per hour
	Teaching allowance	11246	11490	11735	11980	12225	12470	12715	12960	13205	13450	13695	175718	
	Rural posting	11246	11490	11735	11980	12225	12470	12715	12960	13205	13450	13695	HP = 175718/150	
	Total salary	157707.52	161389.75	160574	168758	172442.4	176126.67	179811	183495.1	187179.35	190863.58	194547.84		
3	Consolidated	185635.67	189810.45	193985.3	198160	202334.8	206509.63	210684	214859.2	219034.01	223208.8	227383.65	AV = 2648446/11 steps	1605 per hour
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	240768	
	Teaching allowance	13495	13764	14033	11980	14571	14840	15109	15378	15647	15917	16186	HP = 240768/150	
	Rural posting	13495	13764	14033	11980	14571	14840	15109	15378	15647	15917	16186		
	Total salary	217625.67	222338.45	227051.3	227120	236476.8	241189.63	245902	250615.2	255328.01	260042.8	264755.65		
4	Consolidated	238791.02	245093.77	251396.5	257699	264002	270304.77	276608	282910.3	289213.02	295515.77	301818.63		
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	AV = 3428621/11 steps	2078 per hour
	Teaching allowance	16194	16594	16994	17394	17794	18194	18594	18994	19394	19794	20194	311693	
	Rural posting	16194	16594	16994	17394	17794	18194	18594	18994	19394	19794	20194	HP = 311693/150	
	Total salary	276179.02	283281.77	290384.5	297487	304590	311692.77	318796	325898.3	333001.02	340103.77	347206.63		
5	Consolidated	301841.14	310834.55	319828	328821	337814.8	346808.18	355802	364795	373788.45				
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000			AV = 4401940/9 steps	3261 per hour
	Teaching allowance	20242	20792	21342	21892	22442	22992	23542	24092	24642			489104	
	Rural posting	20242	24542	21342	21892	22442	22992	23542	24092	24642			HP = 489104/150	
	Specialist allowance for medical consultant	91089	93564	96039	98514	100989	103464	105939	108414	110889				
Total salary	438414.14	454732.55	463551	476119	488687.8	501256.18	513825	526393	538961.45					
6	Consolidated	400192.1	411677.68	423163.3	434649	446134.4	457619.99	469106	480591.1	492076.71				
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000			AV = 5692513/9 steps	4217 per hour
	Teaching allowance	25303	25953	26603	27253	27903	28553	29203	29853	30503			632501	
	Rural posting	25303	25953	26603	27253	27903	28553	29203	29853	30503			HP = 632501/150	
	Total salary	400192.1	411677.68	423163.3	434649	446134.4	457619.99	469106	480591.1	492076.71				

Continued

	Specialist allowance for medical consultant	113861	116786	119711	122636	125561	128486	131411	134336	137261	
	Total salary	569659.1	585369.68	601080.3	616791	632501.4	648211.99	663923	679633.1	695343.71	
7	Consolidated	529168.05	543318.92	557469.8	571621	585771.5	599922.39	614073	628224.1	642374.96	
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	
	Teaching allowance	31628	32378	33128	33878	34628	35378	36128	36878	37628	
	Rural posting	31628	32378	33128	33878	34628	35378	36128	36878	37628	
	Specialist allowance for medical consultant	142327	145702	149077	152452	155827	159202	162577	165952	169327	
	Total salary	739751.05	758776.92	777802.8	796829	815854.5	834880.39	853906	872932.1	891957.96	

AV = 7342691/9
 steps
 815855
 HP = 5439 per hour
 815855/150

Source: CONMESS data with effect from January 2015. *Average monthly salary of doctors on each grade level is obtained by summing up the salaries in each level and divided by the number of incremental steps (see Table 1). **Hourly pay value represents the amount for an hour worked. ***Hourly Pay (HP) is obtained by dividing the average monthly salary in each grade level by 150 hours per month (see methods).

sector, which is often blamed on high absenteeism rate of the public sector doctors who are engaged in other income generating activities [35]. These scenarios are 5, 8, 10, 12, 15 and 20 hours (not in any order) per week with 5, 8 and 10 hours as the lower band, and 12, 15 and 20 hours as the upper band. The aim of creating different hypothetical scenarios is to establish the extent of the value of hours that might be lost to the public system under different feasible situations likely to arise due to public/private practice engagements. In this instance, the intention was to show the level of the value of hours lost represented by government salaries paid for work that is never done. These values were estimated under different scenarios and were not built on any empirical data as none existed at the time of this study.

The parameters used for the calculation were the official 40 hours working week (normal routine hours), and monthly gross pay of doctors on different grade levels (1 - 7). The researcher obtained the average monthly salary of doctors on different grade levels by summing up the salaries in each grade level and dividing by the number of incremental steps (the steps to pass through before moving to the next grade level) to obtain the average monthly salary of doctors within each grade level (Table 1). The salary was based on monthly gross pay and not net pay. It was decided not to attempt to get data on actual salaries of employed individuals at the different grades because this would have been sensitive, and the analysis might have allowed individuals to be identified. The averaging of salaries across the increments per grade level and the use of gross salaries mean that it is not possible to make inferences about individual's pay. The Excel Spreadsheet (Table 2) is an example used for creating the different hypothetical scenarios of hours lost to DP by percentage of doctors assumed to engage

Table 2. Example of calculation of different hypothetical hour losses by % of doctors assumed to engage in DP for normal routine work using excel spreadsheets.

Grade levels	Basic hours	AV monthly salary	Monthly hrs (150)	Hourly pay value	Hours lost per week	Value of hours lost per week	Value of hours lost per year	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	40	133450	150	890	5	4448	231313	23131	46263	69394	92525	115657	138788	161919	185051	208182	231313
2	40	175718	150	1171	5	5857	304578	30458	60916	91373	121831	152289	182747	213205	243662	274120	304578
3	40	240768	150	1605	5	8026	417331	41733	83466	125199	166932	208666	250399	292132	333865	375598	417331
4	40	311693	150	2078	5	10390	540268	54027	108054	162080	216107	270134	324161	378188	432214	486241	540268
5	40	489104	150	3261	5	16303	847780	84778	169556	254334	339112	423890	508668	593446	678224	763002	847780
6	40	632501	150	4217	5	21083	1096335	109634	219267	328901	438534	548168	657801	767435	877068	986702	1096335
7	40	815855	150	5439	5	27195	1414149	141415	282830	424245	565659	707074	848489	989904	1131319	1272734	1414149
Total						93303	4851754	485175	970351	1455526	1940702	2425877	2911053	3396228	3881403	4366579	4851754

Example using 5 hours lost on normal work scenario (Source: Research Data).

in DP for normal routine duty.

Next, the supposed hourly pay was calculated. The first step was to multiply the basic 40 hour working week by 45 weeks (with seven weeks removed as the standard holiday entitlement) to obtain 1800 hours paid for per year, and then dividing this by 12 months to obtain 150 hours per month. To obtain the hourly pay, the average monthly salary was divided by 150 monthly hours. This was applied to all the grade levels to obtain the hourly pay of doctors at different grade levels (Table 1). For the outputs from the sensitivity analysis of normal routine hour loss, see Tables S1-S6 for details.

At the same time hourly pay for on-call hours worked over the standard 40 hours was also calculated (hours that might also be lost to DP). The on call pay allowance is the second largest pay chunk after the consolidated or basic pay. A similar approach to that described above was applied. There was no standardised number of hours to spend on on-call hour as there was for the main 40 hours of normal routine hour. Different departments in the hospital have varied on-call hours depending on their workforce strength, but they do not seem to get a higher allowance as the CONMESS document did not specify. The on-call hourly pay was obtained by first obtaining the average monthly on-call hours allowance per grade level. Then the average monthly on-call hours allowance was divided by 150 monthly hours (as above) to obtain hourly pay for on-call hours (Table 3) and an example of the computation of different hypothetical hour losses by the % of doctors assumed to engage in DP for on call duty for one year

Table 3. CONMESS for on-call duty allowance and computation of hourly pay value for doctors on grade levels 1 - 7.

G/Ls	Steps	1	2	3	4	5	6	7	8	9	10	11	*AV monthly on-call duty allowance
1	Consolidated	109707.3											
	Hazard	5000											
	*Call duty	60120											60120
	Teaching allowance	9371											**hourly pay value = 401
	Rural posting	9371											
Total	193570.3												
2	Consolidated	130216	133410	136604	139798	142992	146187	149381	152575	155769	158964	162158	
	Hazard	5000	5000	500	5000	5000	5000	5000	5000	5000	5000	5000	5000
	*Call duty	67160	70120	73080	76040	79000	81960	84920	87920	90880	93840	96840	81978
	Teaching allowance	11246	11490	11735	11980	12225	12470	12715	12960	13205	13450	13695	81978/150
	Rural Posting	11246	11490	11735	11980	12225	12470	12715	12960	13205	13450	13695	hourly pay value = 547
Total	224867.52	231509.75	233653.98	244798.21	251442.44	258086.67	264730.9	271415.13	278059.35	284703.58	291387.84		
3	Consolidated	185636	189810	193985	198160	202335	206510	210684	214859	219034	223209	227384	
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	
	*Call Duty	95320	98440	101560	104680	107800	110920	114040	117160	120280	123400	126520	110920
	Teaching allowance	13495	13764	14033	11980	14571	14840	15109	15378	15647	15917	16186	110920/150
	Rural posting	13495	13764	14033	11980	14571	14840	15109	15378	15647	15917	16186	hourly pay value = 739
Total	312945.67	320778.45	328611.25	331800.04	344276.84	352109.63	359942.42	367775.21	375608.01	383442.8	391275.65		
4	Consolidated	238791	245094	251397	257699	264002	270305	276608	282910	289213	295516	301819	
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	
	*Call duty	124960	128320	131680	135040	138400	141760	145120	148480	151840	155200	158560	141760
	Teaching allowance	16194	16594	16994	17394	17794	18194	18594	18994	19394	19794	20194	141760/150
	Rural posting	16194	16594	16994	17394	17794	18194	18594	18994	19394	19794	20194	hourly pay value = 945
Total	401139.02	411601.77	422064.52	432527.27	442990.02	453452.77	463915.52	474378.27	484841.02	495303.77	505766.63		
5	Consolidated	301841	310835	319828	328821	337815	346808	355802	364795	373788			
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000			
	*Call duty	156880	161400	165920	170440	174960	179480	184000	188520	193040			174960/150
	Teaching allowance	20242	20792	21342	21892	22442	22992	23542	24092	24642			hourly pay value = 1166
	Rural posting	20242	24542	21342	21892	22442	22992	23542	24092	24642			
Specialist allowance	91089	93564	96039	98514	100989	103464	105939	108414	110889				
Total	595294.14	616132.55	629470.95	646559.36	663647.77	680736.18	697824.59	714913	732001.45				

Continued

6	Consolidated	400192	411678	423163	434649	446134	457620	469106	480591	492077	
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	
	*Call duty	190800	196240	201680	207120	212560	218000	223440	228880	234320	212560/150
	Teaching allowance	25303	25953	26603	27253	27903	28553	29203	29853	30503	hourly pay value = 1417
	Rural posting	25303	25953	26603	27253	27903	28553	29203	29853	30503	
	Specialist allowance	113861	116786	119711	122636	125561	128486	131411	134336	137261	
	Total	760459.1	781609.68	802760.26	823910.83	845061.41	866211.99	887362.57	908513.14	929663.71	
7	Consolidated	529168	543319	557470	571621	585772	599922	614073	628224	642375	
	Hazard	5000	5000	5000	5000	5000	5000	5000	5000	5000	
	*Call duty	231600	237760	243920	250080	256240	262400	268560	274720	280880	256240/150
	Teaching allowance	31628	32378	33128	33878	34628	35378	36128	36878	37628	hourly pay value = 1708
	Rural posting	31628	32378	33128	33878	34628	35378	36128	36878	37628	
	Specialist allowance	142327	145702	149077	152452	155827	159202	162577	165952	169327	
	Total	971351.05	996536.92	1021722.8	1046908.66	1072094.52	1097280.39	1122466.25	1147652.13	1172837.96	

Source: CONMESS data with effect from January 2015. *Average monthly on-call duty allowance was calculated by summing up monthly call duty allowance in each grade level and dividing by the number of incremental steps (see [Table 3](#)). **Hourly pay value for each grade level was obtained by dividing average monthly on call duty allowance by 150 hours per month (see methods).

projection using Excel Spreadsheet ([Table 4](#)). In this case, the lower band represents 5, 6 and 7 hours lost in respect of paid on call hours when doctors absent themselves for private practice, while 8, 9 and 10 hours lost denote the upper band for the outputs from the computation of on-call hour loss. This may lead to an uneven estimate of the value of hours lost to DP across departments, but this is controlled for by standardizing it using 40 hours per week like the case of normal routine duty. As described above, these scenarios are hypothetical (see [Tables S7-S12](#)) for the outputs from the sensitivity analysis.

2.3. Ethical Approval

This study was part of bigger mixed-methods study that received ethical approvals from the Committee on Medical and Scientific Research of a public teaching hospital in Nigeria (Ref: NHREC/05/01/2008B-FWA-00002458-IRB00002323) and the state ministry of health (Ref: MH/MSD/EC/0181).

3. Results

The hypothetical estimates of the magnitudes of value of hours lost to the public system because of absences due to DP are presented. To achieve this, a series of hypothetical scenarios were used to estimate the value of hours missed due to absences from the normal routine hour duty of 40-hour per week in the public

Table 4. Example of calculation of different hypothetical hour losses by % of doctors assumed to engage in DP for on-call duty using excel spreadsheet.

Grade levels	Basic hours	AV monthly on-call hour Allowance	Monthly hrs (150)	AV on-call hourly pay value	Hours lost per week	Value of hours lost per week	Value of hours lost per year	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @60 of DP doctors	Value of hours lost per year @70 of DP doctors	Value of hours lost per year @80 of DP doctors	Value of hours lost per year @90 of DP doctors	Value of hours lost per year @100 of DP doctors
1	40	60120	150	401	5	2004	104208	10421	20842	31262	41683	52104	62525	72946	83366	93787	104208
2	40	81978	150	547	5	2733	142096	14210	28419	42629	56838	71048	85257	99467	113676	127886	142096
3	40	110920	150	739	5	3697	192261	19226	38452	57678	76905	96131	115357	134583	153809	173035	192261
4	40	141760	150	945	5	4725	245717	24572	49143	73715	98287	122859	147430	172002	196574	221146	245717
5	40	174960	150	1166	5	5832	303264	30326	60653	90979	121306	151632	181958	212285	242611	272938	303264
6	40	212560	150	1417	5	7085	368437	36844	73687	110531	147375	184219	221062	257906	294750	331594	368437
7	40	256240	150	1708	5	8541	444149	44415	88830	133245	177660	222075	266490	310905	355319	399734	444149
Total						34618	1800133	180013	360027	540040	720053	900066	1080080	1260093	1440106	1620120	1800133

Example using 5-hour loss scenario for on call duty (Source: Research Data).

sector. These estimates would help to provide data on the size of resource outflows from the public system due to DP. These losses therefore are calculated based on the hypothetical 5, 8, 10, 12, 15, and 20-hour loss scenarios per week per year in a typical tertiary hospital in Nigeria. This section focuses on two areas—the normal duty hours and on-call duty hours lost to the public system due to competition for time arising from working in both public and private sectors simultaneously. A combined estimate of different scenarios of the value of hours lost on normal duty hours are presented below.

The estimates represent hourly losses in monetary terms based on the CONMESS data obtained from NSIWC, which took effect from January 2015 (see [Table 1](#)).

In [Figure 1](#), the value of the hours lost if 10% of doctors engage in dual practice and are absent for five of their contracted routine hours is N485,175 or 1586 USD per year. As the number of doctors engaged in DP increases, so the value of hours lost to the public sector rises. Assuming that 20% of doctors engage in DP in one tertiary hospital are absent for five hours per week, the total value of hours lost amounts to N970,351 or 3171 USD per year. With 30% of doctors engaged in DP and absent for 8 hours per week, N2,328,842 or 7611 USD would be lost per annum. If 90% were involved in DP, the total value of hours lost would increase to N4,366,579 or 14,270 USD for five hours of weekly absences, N6,986,526 or 22,831 USD for 8 hours of weekly absences, and N8,733,158 or 28,540 USD for 10 hours of weekly absences, and then for 15 hours of weekly

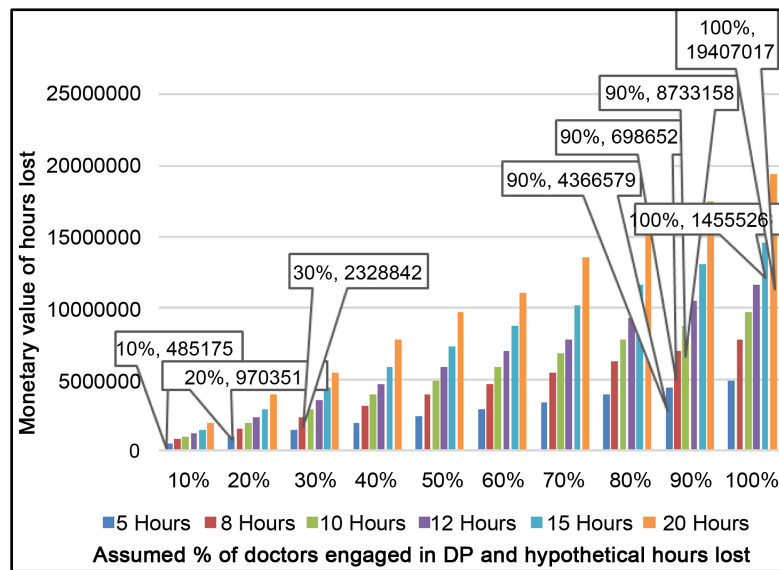


Figure 1. Combined hypothetical estimates of total values of hours lost for weekly absences for normal routine hours. Exchange rate used in **Figure 1:** 1 Naira = USD306 (Source: Central Bank of Nigeria, 2017).

absences if 100% were involved in DP would amount to N14,555,263 or 47,566 USD. At the extreme twenty hours of weekly absences with a 100% of the doctors engaged in DP would result in a loss of N19,407,017 or 63,422 USD to this single tertiary hospital. The value of hours lost to weekly absences per year from the routine hours for the different cadres of doctors in the various scenarios can be found at the supplementary **Tables S1-S6**.

The estimates of on-call hours that could be lost to the public system due to absences resulting from DP are shown below. It uses a series of hypothetical scenarios to estimate the value of hours lost due to on-call hour absences. Apart from the normal 40-hour routine duty per week in the public sector, doctors in tertiary hospitals also spend periods “on call” to deal with emergencies in addition to their normal routine hours. Doctors are paid on-call duty allowance alongside their main salaries. When attendance to cover on call duty is compromised due to private practice, this therefore, involves additional hours lost to the public system. Estimating the magnitude of value of hours lost, helps to provide a clue to the size of resources outflows from the public system. These losses are calculated based on hypothetical 5, 6, 7, 8, 9, and 10-hour loss scenarios per week per year in a typical tertiary hospital in Nigeria.

In **Figure 2**, the total value of hours lost from on-call hours when 40% of the doctors engage in DP with 6 hours weekly absences would be N864,064 or 2824 USD annually. As the number of doctors engaged in DP increased to 60%, the total value of hours lost to the public system for 6 hours weekly absences from on call duty would increase to N1,296,096 or 4236 USD per year. Similarly, the total value of hours lost to on-call duty at 9 hours weekly absences assuming 80% of the doctors engage in DP amounts to N2,592,191 or 8471 USD per annum. If

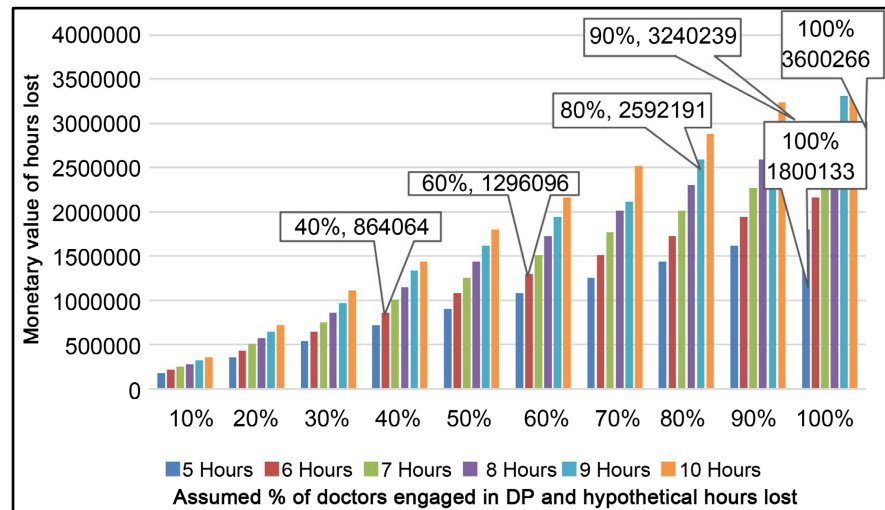


Figure 2. Combined hypothetical estimates of value of hours lost for weekly absences for on call hours. Exchange rate used: 1 Naira = USD306 (Source: Central Bank of Nigeria, 2017).

absences from on call duty rise to 10 hours and 90% of the doctors on all grade levels engage in DP the value lost to the hospital rises to N3,240,239 or 10,589 USD per year, whereas 10 hours of absences with a 100% of doctors having private practice would amount to a value loss of N3,600,266 or 11,766 USD per year. The total value of hours lost to absences per year from the on-call duty for the different cadres of doctors in the various scenarios can be found at supplementary [Tables S7-S12](#).

4. Discussion

This study examines the value of hours lost to the public system due to absences or lateness by DP doctors who engage with private practice. To estimate loss, the author estimated the impact of DP on a single federal tertiary hospital, which employs approximately seven hundred doctors spread across the grades of consultants, registrars, medical officers, and house officers. The number of these doctors involved in DP is not known as there are no official records of DPs in the state and federal ministries of health. Taking account of salaries across a mix of grades, the author created several hypothetical scenarios to represent weekly absences from normal routine duties using various parameters; the same process was applied to on-call duties. The estimated value of hours lost are discussed below. The discussion is based on worst and best-case scenarios in both normal and on call duties.

4.1. Best-Case and Worst-Case Scenarios—Core Working Hours

For the best-case scenario, it was assumed that just 5 hours per week per DP doctor was lost. Taking one extreme of the range and assuming that all doctors (100%) across different grades engage in DP would involve a little above 4.8 million naira or 15,855 USD (see [Figure 1](#) and supplementary [Table S1](#)), which is

the equivalent of an annual value of hours lost to DP. As the percentage of doctors engaged in DP falls so does the magnitude of the value of hours lost to the public system. If the percentage of DPs was reduced to 90% for instance, the corresponding value of hours lost was reduced to over 4.3 million Naira or 14,270 USD per year (supplementary **Table S1**). Similarly, if only 80% of doctors engage in DP the value of hours missed to the public system was pruned to about 3.9 million naira or 12,684 USD (supplementary **Table S1**).

Taking a worst-case of loss of twenty hours per week produces an annual value of hours lost equivalent to 19.4 million naira or 63,422 USD if 100% of the doctors in the hospital is involved in private practice (**Figure 1**) and (Supplementary **Table S6**). This is the worst-case scenario. It shows how much, in the extreme case, could be lost to the system. In reality, this may represent the situation in many healthcare systems in developing countries, including Nigeria, where many senior consultants fail to work their contracted hours in the public system, and boost their income through DP. Even a notional cash loss of half this figure from 50% engagement in DP is sufficient to have a substantial negative impact on patient care in the public system. The extreme case scenario discussed above highlights the large value of hours lost represented by government salaries paid for work that is never done, a loss that becomes very large if the pattern is replicated across the wider healthcare system with all the tertiary/specialist hospitals spread across the country. Even in the best-case scenario, the Government may have been paying salaries for large volumes of work not rendered in the public sector.

The author found no previous studies that estimated the value of hours lost to the public sector of DP absences. However, past studies have shown that health worker absences are common in developing countries [22] [29] [31], and have also commented on transfer of resources from the public to private sector due to competition for time [28] [32]. The present study adds value by using sensitivity analysis to predict the value of hours lost under the different scenarios. It remains the responsibility of the government to reduce the outflow of resources from the public to private sector. One policy approach would be to design incentive packages that discourage DP and reward doctors' presence in the public system. Government may have to think about intramural practice that would allow doctors to engage in DP in the hospital where they work and encourage them to remain there for their contracted hours.

Apart from regular duty hours, doctors in government hospitals are required to be on call for certain periods, and the analysis was extended to consider the value of working hour losses arising from absences affecting this aspect of the work. Again, two scenarios are presented—a worst-case scenario and best-case scenario.

4.2. Best-Case and Worst-Case Scenarios—On-Call Duties

For the best-case scenario in relation to on-call duties in the selected tertiary care

hospital, a five-hour absence was again assumed. If 100% of hospital doctors were involved in DP this would mean a notional value of hours lost equivalent to 1.8 million naira or 5883 USD per annum. If the number of doctors involved is reduced to 50%, the value of hours lost to the selected public hospital from on-call hours would be reduced to 0.9 million naira or 2941 USD per year. A further reduction of this number to 10%, could reduce the value of hours lost to just a hundred and eighty thousand naira or 588 USD a year. Going to a worst-case scenario, a situation where 10 on-call hours per week are lost due to absences or lateness while on call would result in a notional value of hours lost equivalent to 3.6 million naira or 11,766 USD (**Figure 2**) and (Supplementary **Table S12**). A 10-hour weekly loss due to absences across the full range of doctors' grades/levels is almost certain to reduce the early availability of expert assessment and could be especially detrimental to the quality of care in emergency medicine. This not only motivates patients to move to the private sector, but again represents a significant loss to the public hospital in terms of payment for work not undertaken. Problems in staffing on-call hours may lead such cover to be reduced and may incentivize paying patients to seek care outside the public system [33].

Furthermore, federal and state ministries of health, who are the employers of doctors at federal and state levels, can reduce the magnitude of the value of hours lost to the public system through closer monitoring of doctors' working practices, especially regarding the standard 40 hours per week contract. The sensitivity analysis shows that the value of lost hours to the public system is quite high, especially in a worst-case scenario, so that any reduction in the proportion of doctors engaged in DP represents a substantial financial benefit to the system. This again suggests that devising incentives to keep doctors working mainly within the public system is a key area for policy development. The present study used hypothetical scenarios of doctors' likely hours of absence to estimate the value of hours lost to the public system as a result of DP. If a future study could obtain data on individual salaries rather than salary scales and the proportion of doctors engaging in DP, that could help determine whether the approach used here is sufficiently accurate to be used as a management planning tool. Quantifying the value of doctor absences to the public system due to engagement in private practice is important for planning purposes. The approach used here is relatively quick and easy to apply, but a detailed (and more expensive) study based on the real distribution of salaries between DP and non-DP doctors in a typical tertiary hospital could reveal whether the cheaper scenario approach is accurate enough to be useful.

The implication of this result is that Government may have been paying salaries for large volumes of work not rendered in the public sector. The absences may mean a *de facto* transfer of time and human resources to the private sector; thus, public resources are used to develop the private sector. The estimated total financial loss involved could fund a good number of extra consultants to work in the various hospital departments or purchase additional medical equipment that

would improve service delivery. This result adds weight to the argument in favour of DP policy reform in Nigeria.

5. Limitations

In terms of the methodology, computed salary for the sensitivity analysis was based on gross pay and not the net pay. Although the net pay would have produced a more precise estimate of the value of hours lost to DP, gross pay was used to avoid revealing the characteristics of the salary earners. One problem was that the net pay slip contains a scanned photograph and name of the employee, grade level and the amount earned, information which is considered confidential. The decision to rely on gross pay may have overestimated the value of hours lost compared with the value if net pay had been used. Similarly, the hourly-loss scenarios for doctors' absences used in this study were based on doctors' incomes estimated from the known salary scales for staff at different incremental points. They were not based on empirical data on the actual distribution of staff across the scale. Thus, the calculation of salary income received by a given doctor is complex and may change over time. To simplify matters, the estimates of the value of hours lost due to absences in the present study are based on a calculation of average salary across the points on the scale and not the actual salaries. The calculation also did not factor in the actual number of doctors engaged in DP, as such data do not exist, due to the sensitive nature of the issue. Instead, different percentage scenarios are presented. Replicating this exercise using actual salaries based on the real mix of grades in a hospital, and with accurate data on the proportion of doctors engaged in DP, would give a more solid basis for planning. Also, the US dollar exchange rate used in this work was the 2017 official rate reflecting the period the data were collected and therefore, does not represent the current exchange rate values. So, the actual monetary value of hours lost may have been underestimated. This study agrees that hours lost by a doctor in the public system at a particular time may have much greater consequences on the health system than just examining the monetary value, however, other likely consequences were not considered.

6. Conclusion

The value of hours lost to DP due to absences of doctors in this study indicates the extent of losses to the public system. The worst-case scenarios in both routine and call duty suggest a higher conflict of interest with more commitment to private practice than government work. The evidence from this study shows that the value of the resources flowing from the public system to private practices is substantial, particularly in respect of paid hours lost to the public sector when DP doctors do private work at the expense of public sector work. Therefore, the costs to the public system of DP are enormous and need policy intervention. This work raises the important question of what the real contribution of DP to the public sector is and contends that the overall impact of DP on the public system in Nigeria might be negative.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Supplementary

Outputs from Sensitivity Analysis of Normal Routine Hour Loss by % of Doctors Assumed to Engage in DP

Table S1. 5 hours weekly loss to absences by DP doctors on normal routine hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	23131	46263	69394	92525	115657	138788	161919	185051	208182	231313
2	30458	60916	91373	121831	152289	182747	213205	243662	274120	304578
3	41733	83466	125199	166932	208666	250399	292132	333865	375598	417331
4	54027	108054	162080	216107	270134	324161	378188	432214	486241	540268
5	84778	169556	254334	339112	423890	508668	593446	678224	763002	847780
6	109634	219267	328901	438534	548168	657801	767435	877068	986702	1096335
7	141415	282830	424245	565659	707074	848489	989904	1131319	1272734	1414149
Total	485175	970351	1455526	1940702	2425877	2911053	3396228	3881403	4366579	4851754

Table S2. 8 hours weekly loss to absences by DP doctors on normal routine hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	37010	74020	111030	148041	185051	222061	259071	296081	333091	370101
2	48732	97465	146197	194930	243662	292395	341127	389860	438592	487325
3	66773	133546	200319	267092	333865	400638	467411	534184	600957	667730
4	86443	172886	259329	345771	432214	518657	605100	691543	777986	864429
5	135645	271290	406935	542579	678224	813869	949514	1085159	1220804	1356448
6	175414	350827	526241	701654	877068	1052482	1227895	1403309	1578722	1754136
7	226264	452528	678791	905055	1131319	1357583	1583847	1810110	2036374	2262638
Total	776281	1552561	2328842	3105123	3881403	4657684	5433965	6210245	6986526	7762807

Table S3. 10 hours weekly loss to absences by DP doctors on normal routine hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	46263	92525	138788	185051	231313	277576	323839	370101	416364	462627
2	60916	121831	182747	243662	304578	365493	426409	487325	548240	609156
3	83466	166932	250399	333865	417331	500797	584264	667730	751196	834662
4	108054	216107	324161	432214	540268	648321	756375	864429	972482	1080536
5	169556	339112	508668	678224	847780	1017336	1186892	1356448	1526004	1695561
6	219267	438534	657801	877068	1096335	1315602	1534869	1754136	1973403	2192670
7	282830	565659	848489	1131319	1414149	1696978	1979808	2262638	2545468	2828297
Total	970351	1940702	2911053	3881403	4851754	5822105	6792456	7762807	8733158	9703509

Table S4. 12 hours weekly loss to absences by DP doctors on routine hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	55515	111030	166546	222061	277576	333091	388606	444122	499637	555152
2	73099	146197	219296	292395	365493	438592	511691	584790	657888	730987
3	100159	200319	300478	400638	500797	600957	701116	801276	901435	1001595
4	129664	259329	388993	518657	648321	777986	907650	1037314	1166979	1296643
5	203467	406935	610402	813869	1017336	1220804	1424271	1627738	1831205	2034673
6	263120	526241	789361	1052482	1315602	1578722	1842271	2104963	2368084	2631204
7	339396	678791	1018187	1357583	1696978	2036374	2375770	2715165	3054561	3393957
Total	1164421	2328842	3493263	4657684	5822105	6986526	7733375	9315368	10479789	11644210

Table S5. 15 hours weekly loss to absences by DP doctors on routine hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	69394	138788	208182	277576	346970	416364	485758	555152	624546	693940
2	91373	182747	274120	365493	456867	548240	639614	730986.9	822360	913734
3	125199	250399	375598	500797	625997	751196	876396	1001595	1126794	1251994
4	162080	324161	486241	648321	810402	972482	1134563	1296643	1458723	1620804
5	203467	508668	763002	1017336	1271670	1526004	1780339	2034673	2289007	2543341
6	328901	657801	986702	1315602	1644503	1973403	2302304	2631204	2960105	3289005
7	424245	848489	1272734	1696978	2121223	2545468	2969712	3393957	3818201	4242446
Total	1404659	2911053	4366579	5822105	7277631	8733158	10188684	11644210	13099737	14555263

Table S6. 20 hours weekly loss to absences by DP doctorson routine hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	92525	185051	277576	370101	462627	555152	647677	740203	832728	925253
2	121831	243662	365493	487325	609156	730987	852818	974649	1096480	1218311
3	166932	333865	500797	667730	834662	1001595	1168527	1335460	1502392	1669324
4	216107	432214	648321	864429	1080536	1296643	1512750	1728857	1944964	2161071
5	339112	678224	648321	1356448	1695561	2034673	2373785	2712897	3052009	3391121
6	438534	877068	1315602	1754136	2192670	2034673	3069738	3508272	3946806	4385340
7	565659	1131319	1696978	2262638	2828297	3393957	3959616	4525276	5090935	5656594
Total	1940702	3881403	5453090	7762807	9703509	11047679	13584912	15525614	17466315	19407017

Outputs from Computation of On-Call Hour Loss by % of Doctors Assumed to Engage in DP

Table S7. 5 hours weekly loss to absences by DP doctors on on-call hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	10421	20842	31262	41683	52104	62525	72946	83366	93787	104208
2	14210	28419	42629	56838	71048	85257	99467	113676	127886	142096
3	19226	38452	57678	76905	96131	115357	134583	153809	173035	192261
4	24572	49143	73715	98287	122859	147430	172002	196574	221146	245717
5	30326	60653	90979	121306	151632	181958	212285	242611	272938	303264
6	36844	73687	110531	147375	184219	221062	257906	294750	331594	368437
7	44415	88830	133245	177660	222075	266490	310905	355319	399734	444149
Total	180013	360027	540040	720053	900066	1080080	1260093	1440106	1620120	1800133

Table S8. 6 hours weekly loss to absences by DP doctors on on-call hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	12505	25010	37515	50020	62525	75030	87535	100040	112545	125050
2	17051	34103	51154	68206	85257	102309	119360	136412	153463	170515
3	23071	46143	69214	92285	115357	138428	161500	184571	207642	230714
4	29486	58972	88458	117944	147430	176916	206403	235889	265375	294861
5	36392	72783	109175	145567	181958	218350	254742	291133	327525	363917
6	44212	88425	132637	176850	221062	265275	309487	353700	397912	442125
7	53298	106596	159894	213192	266490	319788	373085	426383	479681	532979
Total	216016	432032	648048	864064	1080080	1296096	1512112	1728128	1944143	2160159

Table S9. 7 hours weekly loss to absences by DP doctors on on-call hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	14589	29178	43767	58356	72946	87535	102124	116713	131302	145891
2	19893	39787	59680	79573	99467	119360	139254	159147	179040	198934
3	26917	53833	80750	107666	134583	161500	188416	215333	242249	269166
4	34400	68801	103201	137602	172002	206403	240803	275203	309604	344004
5	42457	84914	127371	169828	212285	254742	297199	339656	382113	424570
6	51581	103162	154744	206325	257906	309487	361069	412650	464231	515812
7	62181	124362	186543	248724	310905	373085	435266	497447	559628	621809
Total	252019	504037	756056	1008074	1260093	1512112	1764130	2016149	2268167	2520186

Table S10. 8 hours weekly loss to absences by DPdoctors on on-call hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	16673	33347	50020	66693	83366	100040	116713	133386	150060	166733
2	22735	45471	68206	90941	113676	136412	159147	181882	204618	227353
3	30762	61524	92285	123047	153809	184571	215333	246095	276856	307618
4	39315	78630	117944	157259	196574	235889	275203	314518	353833	393148
5	39315	97044	145567	194089	242611	291133	339656	388178	436700	485222
6	58950	117900	176850	235800	294750	353700	412650	471600	530550	589500
7	71064	142128	213192	284256	355319	426383	497447	568511	639575	710639
Total	278814	576043	864064	1152085	1440106	1728128	2016149	2304170	2592191	2880213

Table S11. 9 hours weekly loss to absences by DP doctors on on-call hour per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	18757	37515	56272	75030	93787	112545	131302	150060	168817	187574
2	25577	51154	76732	102309	127886	153463	179040	204618	230195	255772
3	34607	69214	103821	138428	173035	207642	242249	276856	311463	346070
4	44229	88458	132687	218350	221146	265375	309604	353833	398062	442291
5	54588	109175	163763	218350	272938	327525	382113	436700	491288	545875
6	66319	132637	198956	265275	331594	397912	309604	530550	596869	736875
7	79947	159894	239841	319788	399734	479681	559628	639575	719522	799469
Total	324024	648048	972072	1337529	1620120	1944143	2113540	2592191	2916215	3313927

Table S12. 10 hours weekly loss to absences by DP doctors on on-call hours per year.

G/Ls	Value of hours lost per year @ 10% of DP doctors	Value of hours lost per year @ 20% of DP doctors	Value of hours lost per year @ 30% of DP doctors	Value of hours lost per year @ 40% of DP doctors	Value of hours lost per year @ 50% of DP doctors	Value of hours lost per year @ 60% of DP doctors	Value of hours lost per year @ 70% of DP doctors	Value of hours lost per year @ 80% of DP doctors	Value of hours lost per year @ 90% of DP doctors	Value of hours lost per year @ 100% of DP doctors
1	20842	41683	62525	83366	104208	125050	145891	166733	187574	208416
2	28419	56838	85257	113676	142096	170515	198934	227353	255772	284191
3	38452	76905	147430	153809	192261	230714	269166	307618	346070	384523
4	49143	98287	147430	196574	245717	294861	344004	393148	442291	491435
5	60653	121306	181958	242611	303264	363917	424570	485222	545875	606528
6	73687	147375	221062	294750	368437	442125	515812	589500	663187	736875
7	88830	177660	266490	355320	444149	532979	621809	710639	799469	888299
Total	360027	720053	1112153	1440106	1800133	2160159	2520186	2880213	3240239	3600266