

---

---

*Cah. Socio. Démo. Méd.,  
Lème année, n°4, p. 529-540 (Septembre-Décembre 2010)*

---

*Cah. Socio. Démo. Méd.,  
50 (4) : 529-540 (September-December 2010)*

---

---

***AN ESTIMATION METHOD FOR  
MIDWIFE DEMAND***

**Derya Camur,  
Zafer Oztek,  
Ozge Karadag Caman**

### ***An estimation method for midwife demand***

*Manpower or human resource planning is a major component of health services planning. In this study, it was aimed to practice an estimation method for midwife demand in a selected region of Ankara, Turkey.*

*In this study, the needs-based approach was used as a method of estimating manpower demand. The study was conducted in one of the central regions in Ankara. Calculations were done separately for 31 primary health care centers in the region. Midwife demand was calculated separately for each of the six specified duties in all health centers. By summing the calculated numbers, midwife demand for each health center was found. In order to determine the approximate time required to deliver each service, 10 midwives from 10 different primary health care centers in the region were selected by random sampling and interviewed.*

*According to the sample calculation presented in this study, the number of midwives required (160) was found to be equal to the current number of midwife posts available in the region. Although this finding was favorable, the fact that 29% of those posts were unfilled constituted a significant problem.*

*Lack of human resources can lead to the lack of essential services, lack of quality in service delivery and loss of strength in primary care. In order to facilitate the optimal delivery of health services, an adequate number of personnel have to be allocated in the most appropriate positions.*

### ***Une méthode d'estimation de la demande en sages-femmes***

*La planification de ressources humaines est une composante importante de la planification des services de santé. Dans cette étude, on a tenté d'appliquer une méthode d'estimation de la demande en sage-femme dans une région particulière d'Ankara, Turquie.*

*C'est l'approche basée sur les besoins qui a été utilisée comme méthode pour estimer la demande en main-d'oeuvre. L'étude a été conduite dans une des régions centrales d'Ankara. Les calculs ont été faits pour chacun des 31 centres de soins de santé primaires et la demande en sage-femmes a été effectuée selon six items dans chaque centre. Cette demande a été évaluée en additionnant les résultats obtenus. De plus, 10 sages-femmes de 10 centres de soins de santé primaires différents de la région ont été choisies par échantillonnage aléatoire, et interviewées.*

*D'après le calcul sur l'échantillon présenté dans cette étude, le nombre de sages-femmes nécessaires (160) correspond au nombre actuel de postes de sage-femme disponible dans la région. Bien que cette conclusion soit positive, le fait que 29 % de ces postes n'étaient pas pourvus, a constitué un problème révélateur.*

*La pénurie en ressources humaines peut amener au manque de services essentiels, à l'absence de qualité dans les services et à un manque d'efficacité dans les soins primaires. Pour faciliter une optimisation des services de santé, un nombre adéquat de personnel doit être alloué dans les positions les plus appropriées.*

## **I- Introduction**

Skilled and well-trained manpower constitutes the most valuable resource of a country. Highly qualified human resources in the health sector are even more important than in other sectors. In this regard, manpower or human resource planning is a major component of health services planning, although it is often not considered as such (1). The main objectives of human resource planning are the training and appropriate distribution and utilization of personnel, who should be adequate in both quantity and quality in order to provide the planned health services (1).

Various approaches have been proposed and used for estimating the supply and requirements for human resources (2). In this regard, four methods have been described traditionally to estimate these requirements as: needs-based approaches, utilization or demand-based approaches, health workforce-to-population ratios, and the target-setting approach (2-4).

In this study, the needs-based approach was used as a method of estimating manpower demand in a selected region of Ankara, Turkey. In the needs-based approach, the number and type of health services to be delivered are estimated based on the health needs of the population, assuming that all health needs can and should be met, and using professional judgments on what are the most appropriate services and technologies to meet those needs (1-3). In this study, the estimation method was practiced for a specific type of personnel (midwives) with specified duties.

## **2- Method**

The study was conducted in one of the central regions in Ankara. Calculations were done separately for 31 primary health care centers in the region, which included 28 "Health Centers" and three "Mother-Child Health and Family Planning Centers".

The following equation, which is suitable to use for personnel with specific duties, was used in the calculations:

$$M = (P \times I \times N \times T) / S$$

M = Manpower

P = Population at risk

I = Incidence

N = Number of services

T = Time required to provide the service (in hours)

S = Yearly shift (in hours)

In the above-mentioned equation, the time required to provide the service and yearly shift were presented in hours <sup>(1)</sup>. Considering 220 working days in a year with six full working hours in a single day, total yearly shift (S) was calculated as 1320 hours.

The main duties of midwives, which were used in the calculations, were defined as follows <sup>(5)</sup>:

- 1) Monitoring of pregnancies
- 2) Birth attendance
- 3) Post-partum monitoring of mothers
- 4) Monitoring of infants
- 5) Monitoring of children
- 6) Women's health and family planning services

In this study, birth attendance was removed from these duties, since births did not take place in primary health care centers in the study region <sup>(6)</sup>.

Midwife demand was calculated separately for each of the six specified duties in all Health Centers. By summing the calculated numbers, midwife demand (M) for each Health Center was found.

$$M = M_1 + M_2 + M_3 + M_4 + M_5 + M_6$$



- M1 : Number of midwives needed for monitoring of pregnancies
- M2 : Number of midwives needed for post-partum monitoring of mothers
- M3 : Number of midwives needed for monitoring of infants
- M4 : Number of midwives needed for monitoring of children aged 1-3 years
- M5 : Number of midwives needed for monitoring of children aged 4-6 years
- M6 : Number of midwives needed for women's health and family planning

'M' values for each Health Center were summed and rounded up to the closest whole number to determine the total number of midwives needed for the region.

### **3- Inputs Used in Calculation**

In this study, most of the population was living in the center of the region (6). Therefore, it was assumed that all primary health care services were delivered in the above-mentioned 31 Health Centers.

Statistical data including population size of the primary health care centers and crude birth rate in the region were taken from the Provincial Health Directorate in Ankara. According to the received data, the crude birth rate in Ankara was ‰ 15 in 2005 (7).

In order to determine the 'T' values that were used in the calculations, 10 midwives from 10 different primary health care centers in the region were selected by random sampling and interviewed. During the interviews, the midwives were asked to estimate the approximate time required to deliver each service, and the mean value of all time estimations were used as 'T' values for each duty.

***Monitoring of pregnancies:*** The number of pregnant women was calculated for each Health Center by using the population size of the specific center and the crude birth rate. Monitoring of each pregnancy was presumed to be once in the first 12 weeks, followed by the 24<sup>th</sup>, 28<sup>th</sup>, 32<sup>nd</sup>, 36<sup>th</sup> and 39<sup>th</sup> weeks, with six appointments in total, each lasting 15 minutes <sup>(5)</sup>.

***Post-partum monitoring of mothers:*** It was presumed that post-partum monitoring would start on the second day after delivery with a total of three appointments in six weeks and that each monitoring would last 15 minutes <sup>(5)</sup>.

***Monitoring of infants:*** It was presumed that a total of nine appointments would be arranged in the first year: on the 2<sup>nd</sup>, 15<sup>th</sup>, 41<sup>st</sup> days, followed by the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 9<sup>th</sup> and 12<sup>th</sup> months and that each monitoring would last 15 minutes <sup>(5)</sup>.

***Monitoring of children:*** Two separate calculations were made for children aged 1-3 and 4-6 years, since monitoring intervals were different for these two periods of childhood. Population sizes of the age groups were calculated by data retrieved from the Regional Health Services Report, 2005 <sup>(6)</sup>.

- Monitoring of children aged 1-3 years: It was presumed that a total of four appointments would be arranged at six-month intervals and that each monitoring would last 10 minutes <sup>(5)</sup>.
- Monitoring of children aged 4-6 years: It was presumed that a total of three appointments would be arranged at one-year intervals and that each monitoring would last 10 minutes <sup>(5)</sup>.

***Women's health and family planning services:*** It was presumed that every woman aged 15 to 49 years in the region would be monitored twice each year and that each monitoring would last 15 minutes <sup>(5)</sup>. Population sizes for these women of reproductive age in the region were retrieved from the Regional Health Services Report, 2005 <sup>(6)</sup>.

#### 4- Sample calculation:

An sample calculation for midwife demand in one of the Health Centers in the region is shown below:

Population size of the Health Center = 45513	N <sub>1</sub> (Number of monitorings for each pregnancy) = 6
Crude birth rate = ‰ 15	N <sub>2</sub> (Number of post-partum monitorings) = 3
P <sub>1</sub> = P <sub>2</sub> = (Estimated number of pregnancies) = 713	N <sub>3</sub> (Number of infant monitorings) = 9
P <sub>3</sub> (Number of infants) = 713	N <sub>4</sub> (Number of monitorings for children aged 1-3 years) = 4
P <sub>4</sub> (Number of children aged 1-3 years) = 2210	N <sub>5</sub> (Number of monitorings for children aged 4-6 years) = 3
P <sub>5</sub> (Number of children aged 4-6 years) = 2371	N <sub>6</sub> (Number of monitorings for women aged 15-49 years) = 2
P <sub>6</sub> (Women aged 15-49 years) = 14108	T <sub>1</sub> = T <sub>2</sub> = T <sub>3</sub> = T <sub>6</sub> = 15 minutes = 0.25 hour
I = 1	T <sub>4</sub> = T <sub>5</sub> = 10 minutes = 0.17 hour
	S = 1320 hours

$$M = P \times I \times N \times T / S$$

$$M_1 \text{ (Monitoring of pregnancies)} = 713 \times 1 \times 6 \times 0.25 / 1320 = 0.8$$

$$M_2 \text{ (Post-partum monitoring of mothers)} = 713 \times 1 \times 3 \times 0.25 / 1320 = 0.4$$

$$M_3 \text{ (Monitoring of infants)} = 713 \times 1 \times 9 \times 0.25 / 1320 = 1.2$$

$$M_4 \text{ (Monitoring of children aged 1-3 years)} = 2210 \times 1 \times 4 \times 0.17 / 1320 = 1.1$$

$$M_5 \text{ (Monitoring of children aged 4-6 years)} = 2371 \times 1 \times 3 \times 0.17 / 1320 = 0.9$$

$$M_6 \text{ (Women's health and family planning)} = 14108 \times 1 \times 2 \times 0.25 / 1320 = 5.3$$

$$M = M_1 + M_2 + M_3 + M_4 + M_5 + M_6$$

$$M = 0.8 + 0.4 + 1.2 + 1.1 + 0.9 + 5.3 = 9.7 (\approx 10) \text{ midwives}$$

According to the sample calculation above, the Health Center was found to require 10 midwives in order to deliver health services as specified in the 'Directive for Implementation of Health Services' <sup>(5)</sup>.



Overall, it was found that the region required 160 midwives in total (Number of midwives needed per Health Center is shown in Table 1). At the time of the study, there were 160 midwife posts available in the region; however, only 114 midwives were employed <sup>(6)</sup>.

**Table 1**  
*Midwife demand of 'Health Centers' and 'Mother-Child Health and Family Planning Centers' in the region (Ankara, 2006)*

Health Center	Care	M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>	M <sub>4</sub>	M <sub>5</sub>	M <sub>6</sub>	Total
No 1		0.7	0.4	1.1	0.7	0.6	5.0	9
No 2		0.2	0.1	0.3	0.4	0.2	1.4	3
No 3		0.8	0.4	1.2	1.1	0.9	5.3	10
No 4		0.4	0.2	0.7	0.9	0.6	3.0	6
No 5		0.1	0.1	0.2	0.3	0.2	0.9	2
No 6		0.2	0.2	0.3	0.2	0.2	1.5	3
No 7		0.5	0.2	0.6	0.4	0.4	3.0	5
No 8		0.1	0.1	0.2	0.2	0.1	0.9	2
No 9		0.02	0.01	0.04	0.03	0.02	0.2	1
No 10		1.5	0.8	2.4	0.8	0.8	10.5	17
No 11		0.2	0.1	0.2	0.1	0.1	0.9	2
No 12		0.4	0.2	0.5	0.4	0.3	2.2	4
No 13		0.3	0.2	0.4	0.3	0.3	2.2	4
No 14		0.3	0.2	0.4	0.3	0.3	1.7	3
No 15		0.4	0.2	0.6	0.8	0.6	2.1	5
No 16		0.05	0.03	0.09	0.07	0.06	0.4	1
No 17		0.9	0.5	1.4	1.3	1.2	6.3	12
No 18		0.3	0.2	0.5	0.4	0.4	2.4	4
No 19		0.1	0.05	0.2	0.3	0.2	0.8	2
No 20		0.3	0.2	0.5	0.3	0.3	2.1	4
No 21		0.1	0.05	0.1	0.3	0.2	1.2	2
No 22		0.3	0.1	0.3	0.4	0.3	1.5	3
No 23		0.7	0.4	1.2	1.3	0.9	4.9	9
No 24		0.3	0.2	0.5	0.4	0.3	2.1	4
No 25		0.5	0.2	0.7	0.7	0.6	3.1	6
No 26		0.2	0.1	0.3	1.1	0.6	2.3	5
No 27		0.9	0.1	0.3	0.3	0.2	1.4	3
No 28		0.2	0.05	0.2	0.2	0.1	0.9	2
No 29		0.7	0.4	1.0	0.9	0.7	4.5	8
No 30		0.5	0.3	0.8	0.7	0.5	3.9	7
No 31		1.2	0.6	1.8	1.2	1.2	7.8	14
Total								160

## 5- Discussion

In this study, the needs-based approach was used as a method of estimating manpower demand. When compared to the other methods, this method is relatively easy to understand,

independent of the current health service utilization and has the potential of addressing the health needs of the population using a mix of HRH. Needs-based approach is especially useful for some programmes such as prenatal and child care and is also useful for advocacy. However, this approach does not take account of users' perspectives based on their values, culture and traditions. Neither does it take into account the different perceptions of patient/client need as viewed by the various types of health workers, who all may hold vastly different perceptions based on their values, traditions and professional judgments. Needs-based approach also ignores the question of efficiency in allocation of resources among other sectors and requires extensive data <sup>(3,4,8)</sup>.

According to the sample calculation presented in this study, the number of midwives required was found to be equal to the current number of midwife posts available in the region. Although this finding was favorable, the fact that 29% of those posts were unfilled constituted a significant problem. On the other hand, some of the duties of midwives aforementioned in this article have also been defined among the duties of the nurses. Therefore, the lack of midwives in the region might have been compensated by nurses. This means that in health services, which are delivered by teamwork, common duties of different types of health personnel have to be kept in mind during manpower planning. This is the only means by which we can have a realistic calculation of personnel demand.

In Turkey, although a recent health reform was made to change primary health care service delivery, Law No. 224 on Socialization of Health Services <sup>(9)</sup> is still in effect. According to this law and the new law on family medicine practice, special emphasis should be given to preventive health services in primary care. However, lack of human resources can lead to the lack of essential services, lack of quality in service delivery and loss of strength in primary care. In order to facilitate the optimal delivery of health services, an adequate number of personnel have to be allocated in the most appropriate positions. This can

be achieved through manpower planning both at the county and provincial levels.

### References

1. Hornby P, Ray DK, Shipp PJ, Hall TL. Guidelines for Health Manpower Planning. Geneva: World Health Organization, 1980.
2. Dreesch N, Dolea C, Dal Poz MR, Goubarev A, Adams O, Aregawi M, Bergstrom K, Fogstad H, Sheratt D, Linkins J, Scherpbier R, Youssef-Fox M. An approach to estimating human resource requirements to achieve the Millennium Development Goals. *Health Policy Plan.* 2005 Sep; 20(5): 267-76. Epub 2005 Aug 2.
3. Hall T and Mejia A. Health manpower planning: principles, methods, issues. Geneva: World Health Organization, 1978.
4. Markham B and Birch S. Back to the future: a framework for estimating health-care human resource requirements. *Can J Nurs Adm* 1997; 10: 7-23.
5. 'Directive for Implementation of Health Services' (Saglik Hizmetlerinin Yurutulmesi Hakkinda Yonerge), Ankara: The Ministry of Health of Turkey, 2001.
6. Kecioren Training and Research District, Local Health Authority. Regional Health Services Report 2005, Ankara, 2006.
7. Statistics of Provincial Health Directorate of Ankara, Ankara, 2006.
8. O'Brien-Pallas L, Baumann A, Donner G et al. Forecasting models for human resources in health care. *J Adv Nurs* 2001; 33: 120-9.
9. 'Law No. 224 on Socialization of Health Services' (Saglik Hizmetlerinin Sosyallestirilmesi Hakkinda Kanun), *Official Gazette* of Republic of Turkey, No: 10705, Ankara, 1961.