

# Application of the WHO Method of Workload Indicators of Staffing Needs to Evaluate Health Workers Availability and Capacity for Universal Health Coverage in Maternal and Child Health in Benin

Sossou Justin Adanmavokin\*, Sossou Gilles Armand, Igué Babatounde Charlemagne, Ouendo Edgard-Marius

Regional Institute of Public Health, Comlan Alfred Quenum Ouidah, Benin

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**Abstract** To assess the operational capacity of human resources in maternal and child health services, in order to provide equitable and sustainable universal health coverage in Benin, the Workload Indicators of Staffing Need (WISN) study was conducted. Method: A total of 487 health facilities and public hospitals were sampled, representing 75% of the public health facilities. Health professionals involved in maternal and child health care were exhaustively included. Results: Overall, 487 health facilities with 3,870 human resources of all categories were evaluated for their workloads. The analysis shows that the country does not have the necessary manpower to handle the workload. The time spent by the health professional on activities changes according to the type of activity. Finally, it is noted that there is work pressure on health professionals which changes according to the type of activity. Discussion: The shortage situation leads to inequity in the distribution of human resources and is a reason for allocative and technical inefficiency. It is observed that qualified human resources devote little working time to the main activities, which explains the observed high morbidity and mortality rates, particularly for mothers and children. In conclusion, the analysis of the results shows that the pressure of work is greater in rural areas than in urban areas for the professional categories most encountered in rural areas and that the health system is fragile in the country.

**Keywords** WISN, Labor Pressure, Equity, Maternal and Child Health, Universal Health Coverage, Availability of Human Resources for Health, Benin Republic

## 1. Introduction

Like most countries in sub-Saharan Africa, the Republic of Benin is characterized by a high mortality rate. Specifically, the probability of dying between the ages of 15 and 50 is 111‰ for women and 153‰ for men; maternal mortality is 391 deaths per 100,000 live births; child mortality is 96‰, infant mortality is 55‰, and neonatal mortality is 30‰ [1].

Health statistics for the year 2017, in Benin, mention that the ratio number of doctors per population is 1.5 per 10,000 inhabitants, the ratio number of nurses per population is 2.4 per 5,000 inhabitants and that of midwives is 5.7 per 5,000 women of childbearing age [2]. An assessment of the coverage of qualified human resource needs (doctors, nurses, and midwives) gives a ratio number of 4.76 per 10,000 inhabitants against 25 recommended by the WHO. A review of the survey results conducted on the availability and operational capacity of health services [3] reveals that the country is exposed to a low operational capacity of maternal and child health services (MCH). Among other things, it is observed that only 38% of the human resources are trained for an optimal capacity of antenatal care, and basic obstetric and neonatal care services and 62% of the agents are trained for child immunization services.

An analysis of the health system, with a view to universal health coverage (UHC), reveals a certain fragility at the level of various pillars of the system, particularly related to the management of human resources in health [4]. These weaknesses in human resources are further worsened by the implementation of Decree No. 2018-342 of 25 July 2018 suspending the issuance of authorizations and revoking authorizations for the private practice of the medical or paramedical professions by a civil servant or

contractual public servant and measures pertaining to the closure of illegal private practices. An evaluation of the private health sector in 2013 indicates that only 12% of the private health facilities had a license to provide health care and services [5].

Moreover, the work of the Technical Commission on Health Sector Reforms noted that 54% of the demand for health care in Benin is captured by the private sector [4]. The diagnosis carried out by the commission set up by the new government in 2016 has revealed, among other things, almost non-existent governance in the sector, poor distribution and disastrous management of resources (human, material and financial), an almost total absence of a regulatory authority for the exercise of the health profession, an absence of a policy for training and recruiting specialists, an absence of a policy to encourage the exercise of the profession in deprived areas [4]. Thus, the first consequence of various measures in reform of the health system will be to return a large proportion of private health care who does not have a legal existence to public health facilities. All this will lead to an increase in demand for health care services and the workload in public health care facilities. This increase will be further accentuated with the implementation of the UHC component of the "Insurance for Human Capital Development (ARCH)" project due to the removal of financial barriers to the use of health services. The ARCH project is an initiative of the government of the Benin Republic aimed at implementing its social protection policy, which covers health insurance, retirement for actors in the informal sector, promotion of micro-credit, and training for the poor. For the health insurance component, the State provides full coverage of health insurance for the extremely poor people and partial coverage for the non-extreme poor population [6].

The problem that emerges from the densities of health personnel is that of an under-staffing of health workers in Benin's public health sector. In turn, an insufficient number of health workers increases the workload. The increase in the workload per active agent will result in a deterioration in the quality of health services and care in the public health sector. In this context of a shortage of health professionals, the implementation of Universal Health Coverage (UHC) will result in the collapse of the health system. Indeed, with the UHC, the demand for health services and care will increase as the number of health professionals is reduced because of the measures mentioned above. By removing the financial barriers that prevented the population from using health services and care, the UHC will contribute to an increase in demand and, in turn, longer waiting times for consultation appointments and access to health services and care.

The objective of this study is to "evaluate health workers' availability and capacity for universal health coverage in maternal and child health in Benin, using the method of Workload Indicators of Staffing Needs (WISN). Developed by Peter J. Shipp for the WHO in 1998 [7], the

WISN method is a tool for managing and planning human resources for health. It is used to determine the number of health workers needed to meet the workload of a health facility and assess the workload pressure on health workers [8]. The WISN method produces information and indicates how it can be used by decision-makers in health facilities to optimize the current and future management of the human resources for health in their care [7]. It helps to assess the distribution of staff between the types of establishments at the same level of the health pyramid, in order to identify over or under-staffing in terms of workload and to estimate the size of the deficit or surplus [9].

The WISN method has already been proven in India to calculate the number of human resources needed to achieve universal coverage of maternal and child health care [10]. It was also used to estimate nursing needs and provide a description of the imbalances in Burdwan Rural Hospital in India [11]. The evaluation of the workload carried out in Uganda using the same method showed that the health facilities involved in the study had fewer nurses, midwives, and doctors than required, resulting in high work pressures, while all the facilities visited were overstaffed for nursing auxiliaries [12]. In Tanzania, researchers hypothesized that the availability of qualified human resources plays a determining role in the problem of maternal and perinatal morbidity and mortality, a WISN evaluation was carried out in sixteen (16) health facilities in Dar Es Salaam [13]. According to the results of this evaluation, there was a huge workload pressure on perinatal care in the institutions studied. A study conducted in Kenya using the WISN method at the community health care level found two results: first, the study revealed a shortage of health extension workers with a WISN ratio of 0.27 and community health workers with a WISN ratio of 0.74; second, the study showed that community health workers were under greater workload pressure than health extension workers [14]. Another study carried out with the WISN method in Niger and Burkina Faso found that the complementary measures increased the rate of use of health services and care, which, in turn, resulted in an overload of work for Health workers in both of the countries [15]. Moreover, the study revealed that the structures involved in the study in Niger did not have enough staff to cover the workload [15]. Another use of the WISN method in Xicheng in Beijing revealed the need for skilled human resources to cover community health care and to set time standards for community health activities [16]. Similar work in Papua New Guinea identified the main components of a health care provider's work, estimated the time needed to meet them, and defined standards for skilled health human resources [17]. Work carried out in Latin America has shown the relevance of using the WISN method to identify the components of the workload of nursing professionals and to define human resource standards for universal health

coverage [18]. The use of WISN at Mityana General Hospital in Uganda revealed a shortage of skilled human resources and revealed that non-core activities contributed to high work pressure in all units of the hospital, thus undermining the quality of services [19]. Work carried out at Laco Hospital in Uganda has shown that the WISN method can be used to assess situations of overstaffing and understaffing and also determine not only the work pressure on nursing staff, but also provide a basis for optimal management of human resources for quality health service delivery [20]. Finally, the application of the WISN method in Namibia has made it possible to highlight the lack of qualified health workers and the inequalities observed in their distribution and also note that the shortage is more serious at the level of doctors and pharmacists while nurses are slightly overstaffed [21].

Overall, these various studies confirmed the more structured and rational approach in identifying and planning health workers needs developed by Peter J. Shipp. This approach differs from the traditional approach based on the calculation of the ratio of health personnel to population to be covered. These studies have also shown the extent to which the WISN should be used for planning health workers needs and for determining the work pressure on health professionals in health facilities.

## 2. Materials and Methods

### 2.1. Type, Period, Setting, and Population of the Study

This was a cross-sectional, descriptive, and analytical study that took place from November 2018 to August 2019. The framework of the study is the Benin Republic, a country located in West Africa with a surface area of 114,763 square kilometers and an estimated population of 11,554,473 inhabitants, according to the 2018 projections [22]. The objective of the study was to evaluate the operational capacity of human health resources of maternal and child health services (MCH) to offer an equitable and sustainable UHC in Benin, the study population is composed of two targets: primary and secondary. Health workers are the primary target. These are general practitioners in a health centre, or a hospital, paediatricians, gynaecologists, surgeons, internists, anaesthetists, nurses, midwives, and health care assistants. They are responsible for caring for patients by the delegation of authority from the health facilities to which they belong through employment contracts. Thus, the health facilities are the secondary target, capable, through the management and organizational decisions, of encouraging health workers to be more productive.

### 2.2. Study Data

The data used in this study comes from the database of health facilities contained in the "District Health Information Software 2" (DHIS2) for the year 2018.

DHIS2 2018 was used as the sampling frame. In DHSI2 2018, health facilities (secondary target) were recorded by department, by type of facility, and by the practice setting (rural, urban). Thus, Benin has 780 public health facilities, including 42 hospitals. The pyramidal structure of Benin's health system means that the secondary target can be broken down into two categories: first contact and reference health facilities. The distribution of health centers by area of activity shows that 83% of the centers are located and operate in rural areas, while 17% operate in urban areas.

#### 2.2.1. Sampling

##### Selection of first-contact health facilities

Two selection rules have been defined for first-contact health centers. The first is related to the public status of the health facility and the second rule is related to the activity rate of each health facility, which consists of having carried out at least four interventions per day, i.e. 1,240 interventions per year. All types of facilities are represented (isolated dispensaries, isolated maternity units, commune health facilities). The services selected for the workload study are dispensary and maternity in the first contact health centers. In association with the two previous criteria in choice of first-contact health facilities, the criterion of the number of health center staff was specifically selected. Thus, in the Littoral department, which is a center of concentration of qualified human resources for health, all the health facilities operating in the department were systematically selected.

##### Selection of reference health facilities

For the choice of the reference health facilities, the exhaustiveness rule was used. Thus, the twenty (20) functional public district hospitals that constitute the first level of reference were systematically selected, the six (6) functional departmental hospital facilities (CHD) that constitute the second level of reference were systematically selected and the two university hospital centers that constitute the tertiary level of reference were also systematically selected. At the level of these reference facilities, the maternal and child health care services, in particular, the medical, paediatric, gynaecological and surgical services and the emergency departments were selected.

##### The criterion of the activity rate of first-contact health center

For the selection of first-contact health facilities, we used a probabilistic method with a stratified technique. A simple random selection of 75% of the health facilities in both rural and urban areas, that carry out at least 1,240 interventions per year, was done. Once the choice of facilities was made, at the level of peripheral health facilities, all the health professionals who worked there were selected with their workload. At the level of district hospitals, the Departmental Hospital facilities (CHD) of

the Mother and Child Lagoon Hospital (HOMEL) and the Hubert K. Maga National University Hospital Centre (CNHU H.K.M), all the health professionals who work in MCHs were selected with their workload.

In fact, it emerged from surveys of health facilities that some facilities have a total of less than four interventions per day. In the context of this study, the notion of "intervention" refers to the actions that the health professional can perform on the user of health services. These acts include consultations, curative care, prenatal consultations, deliveries, postnatal consultations, and other activities. On the basis of this indicator of the level of activity of health facilities, health centers with an activity rate of less than four per day were excluded from the sample. Annual projections show that health facilities with less than four interventions per day have an activity rate of less than 1,240 interventions per year. Data from DHIS2 in 2018 show that 131 health facilities in Benin do not carry out at least four interventions per day, i.e. 16.79% of the health facilities. Thus, it emerges that out of a total of 780 public health facilities, 649 have an activity rate of more than four interventions per day and therefore, relevant to this study.

#### Selection of health workers

For the selection of health workers, we used two approaches that take into account the level of the health pyramid. The first approach consists of taking the level of the first-contact health facilities (dispensary/maternity clinic or dispensary and maternity clinic) selected in the first stratum, all the health personnel (health assistant at the dispensary, maternity assistant, nurse at the dispensary and midwife at the maternity clinic) that are there, and to record the amount of work carried out by each category of professional during the year 2018. The choice is motivated by the fact that the quality of health services and care offered at the first contact determines the use of the first referral and the need to act in time to avoid the three delays in MCH defined by Thaddeus S., Maine D [23]. The second approach consists of taking health professionals from the district hospital, the CHD, the Mother and Child Lagoon Hospital and the CNHU H.K.M., who intervene in the care of MCH. These are general practitioners in the hospital, specialist practitioners in surgery, gynecology and pediatrics, specialist internist practitioners, and midwives in the maternity ward.

#### 2.2.2. Sample size

In order to have a projection very close to the real situation of the staffing needs of all the health facilities, it was decided to sample 75% of the 649 health facilities with an activity rate higher than four (4) interventions per day, i.e. 1240 interventions per year. Taking into account the selection criteria presented above, 487 selected health facilities were divided into 459 first contact health facilities, 20 district hospitals, six CHDs, and two university

hospitals.

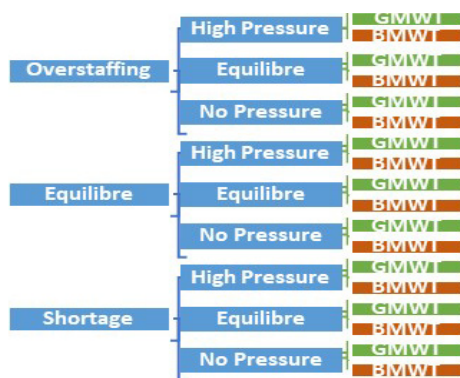
#### 2.2.3. Data collection techniques and tools

Data collection was carried out using the WISN method, a human resources management tool. The WISN method makes it possible to determine the number of health workers, of a certain type, needed to cope with the workload of a given health facility and help assess the workload pressure of the health workers in the facility in question. The collection focused on quantitative data available through the health information system and workload data. Two sources of data were used to complete the tool: primary sources consisting of registers B1, B5a, B11, C6, C7, A12 used in the framework of data collection from the national health information and management system (SNIGS) and secondary sources that took into account the data collected in the DHIS 2 database. In addition, for workload data, the collection technique used was semi-structured interviews to identify, according to the occupational health category, workload components, tasks, staff salaries, activity standards, and data sources. Activity standards sheets, questionnaires, the remuneration grid for categories of human resources, and the calculation sheet for the available working time were used. A team of 34 pairs of interviewers covered the 34 health districts in Benin over a period of ten days.

### 2.3. Data Analysis

As part of the database audit, a reconciliation was made with the 2018 health workforce statements. To ensure the quality of the data collected, primary data sources were triangulated with DHIS2. Based on the specific reports of each health facility generated by the WISN tool, an Excel database was developed in order to be able to assess the situation of ratios and gaps by health districts, by the department and at national level. Data entry in the WISN tool allowed automatic calculation of the required workforce by professional category and by a health facility, the differences or gaps, the WISN ratio, and the salary costs. The criteria for interpreting the results can be summarized as follows: for differences, when the difference is greater than 0, there is a shortage; when the difference is less than 0, there is a surplus; and when the difference is equal to 0, there is a balance. However, the WISN ratio is equal to the quotient of the available workforce to the required workforce. When the ratio is 0, there is no available staff; when the ratio is between 0 and 1, there is a high workload pressure; when the ratio is 1, there is equilibrium; and there is a normal situation and when the ratio is greater than 1, there is no workload pressure [7].

The conceptual framework below highlights the different modalities of results that WISN can generate. The ideal trend to look for in the application of the WISN tool is for the workforce to be at equilibrium, in harmony with the workload, with good management of working time.



Cadre conceptuel d’analyse de la disponibilité et de la capacité opérationnelle des Ressources Humaines en Santé Qualifiées

Légende : = GM Good Management of Working Time and BMWT = Bad Management of Working Time

### 2.4. Ethical Aspects

The informed consent of the actors surveyed was obtained and we ensured that anonymity and confidentiality were respected.

## 3. Results

### 3.1. Characteristics of the Sample

A total of 487 health facilities were surveyed, representing 100% of the planned health facilities. Overall, 3,870 health workers, of all categories combined, had their workloads assessed, including 1,013 Maternity Care Assistants, 729 Dispensary Care Assistants, 72 Health Action Inspectors Anaesthetists, 36 Dispensary Nurses, 38 Health Centre General Practitioners, 45 Hospital General Practitioners, 51 Surgical Specialist Practitioners, 66 Obstetrics and Gynaecology Specialist Practitioners, 9 Internist Specialist Practitioners, 37 Paediatric Specialist Practitioners, and 926 Maternity Midwives.

### 3.2. Human Resources for Health Needed to Handley the Workload in Health Facilities

In terms of HHR staffing, two indicators are estimated in this work: the number of HHR staff required to handle the overall workload and the workload in a practice setting.

#### 3.2.1. Staffing requirements to meet the overall workload in health facilities

Table 1 shows the staffing requirements to handle the overall workload in the health facilities. It presents, by HHR category, the staff available at the time of the study and the staff required to handle the overall workload. By comparing the two, we have identified situations of balance, shortage, or overstaffing.

**Table 1.** Summary of HHR staffing to meet the overall workload in Benin's health facilities in 2018

HHR Categories	Staff available (A)	Staffing requirements (B)	Discrepancies	% (B/A)	Nature of the discrepancy
Maternity Care Assistant	1013	721	-292	140	overstaffing
dispensary Care Assistant	729	769	40	95	Shortage
Inspector of Health Action Anesthesiologist	72	76	4	95	Shortage
Nurse at the dispensary	36	84	52	43	Shortage
General Practitioner Health Centre	38	38	0	100	Equilibre
General Practitioner Hospital	45	47	2	96	Shortage
Specialist Practitioner - Surgery	51	49	-2	104	overstaffing
Specialist Practitioner Gynecologist	66	84	18	79	Shortage
Specialist Practitioner - Internist	9	19	10	47	Shortage
Specialist Practitioner - Pediatrician	37	69	32	54	Shortage
Midwife at the maternity ward	926	1652	726	56	Shortage
Grand Total	3870	4460	590	87	Shortage

Source: survey respondent data

The assessment determined the staffing requirements to meet the overall workload in health facilities for certain categories of health professionals to cover maternal and child health. Overall, a situation of overstaffing was observed among maternity care assistants, with a surplus of 292. Only one category, that of general practitioners at the health center, is in a situation of equilibrium. For this category, the number of staff available is equal to the number required to provide quality health care. There is also a shortage of nurses at the dispensary, with a gap of 52 agents to be filled. The same situation of shortage is noted at the level of midwives with a gap to be filled by 726 agents.

### 3.2.2. Staffing requirements for workload in health facilities by practice setting

Tables 2 presents the staffing requirements to handle the workload in the health facilities. They show the balance, shortage, and overstaffing between urban and rural areas.

**Table 2.** Summary of situations of balance, shortage, and overstaffing of human resources for health in Benin in urban and rural areas for the year 2018

Staff problem	Corp	Place of assignment			% Rural	% Urban	
		Rural	Urban	Grand Total			
<b>Equilibre</b>	Maternity Care Assistant		1	1	0%	100%	
	Dispensary Care Assistant	1		1	100%	0%	
	Nurse at the dispensary	3		3	100%	0%	
	Specialist Practitioner Gynecologist		7	7	0%	100%	
	Midwife at the maternity ward		31	31	0%	100%	
<b>Total Equilibre</b>		<b>4</b>	<b>39</b>	<b>43</b>			
<b>Shortage</b>	Maternity Care Assistant	93,84	57,43	151,27	62%	38%	
	Dispensary Care Assistant	222,01	92,46	314,47	71%	29%	
	Inspector of Health Action Anesthesiologist		46,17	46,17	0%	100%	
	Nurse at the dispensary	419,77	71,28	491,05	85%	15%	
	General Practitioner Health Centre		8,39	8,39	0%	100%	
	General Practitioner Hospital		29,82	29,82	0%	100%	
	Specialist Practitioner - Surgery		26,2	26,2	0%	100%	
	Specialist Practitioner Gynecologist		45,64	45,64	0%	100%	
	Specialist Practitioner - Internist		16,09	16,09	0%	100%	
	Specialist Practitioner - Pediatrician		54,12	54,12	0%	100%	
	Midwife at the maternity ward	989,55	470,56	1460,11	68%	32%	
	<b>Total Shortage</b>		<b>1725,17</b>	<b>918,16</b>	<b>2643,33</b>		
	<b>Overstaffing</b>	Maternity Care Assistant	185,92	183,89	369,81	50%	50%
Dispensary Care Assistant		212,3	91,84	304,14	70%	30%	
Inspector of Health Action Anesthesiologist			28,61	28,61	0%	100%	
Nurse at the dispensary		156,07	148,36	304,43	51%	49%	
General Practitioner Health Centre		0,48	6,02	6,5	7%	93%	
General Practitioner Hospital		0	11,97	11,97	0%	100%	
Specialist Practitioner - Surgery		0	13,65	13,65	0%	100%	
Specialist Practitioner Gynecologist		0	23,72	23,72	0%	100%	
Specialist Practitioner - Internist		0	1,22	1,22	0%	100%	
Specialist Practitioner - Pediatrician		0	7,48	7,48	0%	100%	
Midwife at the maternity ward	7,89	147,83	155,72	5%	95%		
<b>Total Overstaffing</b>		<b>562,66</b>	<b>664,59</b>	<b>1227,25</b>			
<b>Grand Total</b>		<b>2291,83</b>	<b>1621,75</b>	<b>3913,58</b>			

Source: survey respondent data

From this table, it can be observed that compared to the nurses in the dispensary, the shortage is 85% in rural areas and 15% in urban areas. For midwives, the shortage is 68% in rural areas and 32% in urban areas.

Observing the table reveals a situation of overstaffing of midwives at the maternity hospital estimated at 95% in urban areas and 5% in rural areas. Similarly, the situation of overstaffing is observed among doctors in health centers to be 93% in urban areas and 7% in rural areas.

### 3.3. Distribution of HHR Working Time in the Public Sector

The results obtained on the basis of the distribution of working time will be presented and analyzed globally and according to the place of assignment.

#### 3.3.1. Overall distribution of HHR working time in the public sector

Table 3 summarizes the use of HHR working time.

Three groups of activities were measured in 2018: main, support, and additional activities.

Overall, the minimum working time devoted to the main activities is 13.42% carried out by general practitioners at the health facility and the maximum is 67.12% carried out by midwives. The minimum time devoted to support activities is 27.45% carried out by midwives and the maximum time devoted to support activities is 84.07%, carried out by general practitioners working in health facility. The minimum time devoted to additional activities is 0.78% carried out by maternity care assistants and the maximum time is 14.25% carried out by nurses at the dispensary.

#### 3.3.2. Distribution of HHR working time in the public sector by mid-year in 2018

Tables 4a and 4b present the results of the distribution of HHR working time in the public sector in Benin, according to the criterion of activity and mid-year in 2018.

**Table 3.** Distribution of HHR working time by activity groups in the public sector in Benin in 2018

Corps des RHS	Activity Groups							
	Main Activities		Support activities		Additional Activities		Total	
	Working time	Weight (%)	Working time	Weight (%)	Working time	Weight (%)	Working time	Weight (%)
Maternity Care Assistant	319,59	43,83	403,9	55,39	5,7	0,78	729,19	100
Dispensary Care Assistant	328,55	29,4	715,68	64,03	73,41	6,57	1117,64	100
Inspector of Health Action Anesthesiologist	62,98	60,69	39,5	38,06	1,3	1,25	103,78	100
Nurse at the dispensary	516,05	42,12	534,48	43,63	174,52	14,25	1225,05	100
General Practitioner Health Centre	9,53	13,42	59,69	84,07	1,78	2,51	71	100
General Practitioner Hospital	27,45	36	46,82	61,4	1,98	2,6	76,25	100
Specialist Practitioner - Surgery	27,27	36,49	45,09	60,33	2,38	3,18	74,74	100
Specialist Practitioner Gynecologist	55,01	51,16	50,77	47,22	1,74	1,62	107,52	100
Specialist Practitioner - Internist	12,17	35,6	21,23	62,09	0,79	2,31	34,19	100
Specialist Practitioner - Pediatrician	43,48	48,48	44,79	49,94	1,42	1,58	89,69	100
Midwife at the maternity ward	1318,67	67,12	539,31	27,45	106,64	5,43	1964,62	100

Source: survey respondent data

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**Table 4a.** Breakdown of HHR working time in the public health sector in Benin according to activity criteria and mid-year in 2018

HHR Corps	Activity Groups	Exercise environment				
		Rural	Urban	Total general	% Rural	% Urban
Maternity Care Assistant	Main Activities	203,02	116,57	319,59	39%	57%
	Additional Activities	4,57	1,13	5,7	1%	0%
	Support activities	316,81	87,09	403,9	60%	43%
<b>Total Maternity Care Assistants</b>		<b>524,4</b>	<b>204,79</b>	<b>729,19</b>	<b>72%</b>	<b>28%</b>
Maternity Care Assistant at the Health Facility	Main Activities	57,41	8,99	66,4	51%	63%
	Additional Activities	0,81	0,13	0,94	1%	1%
	Support activities	55,04	5,2	60,24	49%	36%
<b>Total Maternity Care Assistants at the Health Facility</b>		<b>113,26</b>	<b>14,32</b>	<b>127,58</b>		
Maternity Care Assistant at the Hospital	Main Activities		92,74	92,74		73%
	Additional Activities		1,75	1,75		1%
	Support activities		32,68	32,68		26%
<b>Total Maternity Care Assistants at the Hospital</b>			<b>127,17</b>	<b>127,17</b>		
Dispensary Care Assistant	Main Activities	228,99	99,56	328,55	27%	39%
	Additional Activities	58,41	15	73,41	7%	6%
	Support activities	574,63	141,05	715,68	67%	55%
<b>Total dispensary Care Assistants</b>		<b>862,03</b>	<b>255,61</b>	<b>1117,64</b>		
Inspector of Health Action Anesthesiologist	Main Activities		62,98	62,98		63%
	Additional Activities	0	1,3	1,3		1%
	Support activities	4,4	35,1	39,5		35%
<b>Total Inspectors of Health Action Anesthesiologist</b>		<b>4,4</b>	<b>99,38</b>	<b>103,78</b>		
Nurses at the dispensary	Main Activities	361,77	154,28	516,05	39%	52%
	Additional Activities	135,38	39,14	174,52	15%	13%
	Support activities	431,94	102,54	534,48	46%	35%
<b>Total Nurses at the Dispensary</b>		<b>929,09</b>	<b>295,96</b>	<b>1225,05</b>		
General Practitioners of the Health Center	Main Activities	0,23	9,3	9,53	2%	16%
	Additional Activities	0,17	1,61	1,78	1%	3%
	Support activities	13,39	46,3	59,69	97%	81%
<b>Total General Practitioner in the Health Center</b>		<b>13,79</b>	<b>57,21</b>	<b>71</b>		
General Practitioners in Hospitals	Main Activities		27,45	27,45		36%
	Additional Activities		1,98	1,98		3%
	Support activities		46,82	46,82		61%
<b>Total General Practitioners in Hospitals</b>			<b>76,25</b>	<b>76,25</b>		

Source: survey respondent data



**Table 4b.** Breakdown of HHR working hours in the public health sector in Benin according to activity criteria and the environment of affection in 2018

HHR Corps	Activity Groups	Exercise environment				
		Rural	Urban	Total general	% Rural	% Urban
Specialist Practitioner - Surgery	Main Activities		27,27	27,27		39%
	Additional Activities	0	2,38	2,38		3%
	Support activities	5,32	39,77	45,09		57%
<b>Total Specialist Practitioners - Surgery</b>		<b>5,32</b>	<b>69,42</b>	<b>74,74</b>		
Specialist Practitioner Gynecologist	Main Activities		55,01	55,01		54%
	Additional Activities	0	1,74	1,74		2%
	Support activities	5,32	45,45	50,77		44%
<b>Total Specialist Practitioners Gynecologist</b>		<b>5,32</b>	<b>102,2</b>	<b>107,52</b>		
Specialist Practitioner - Internist	Main Activities		12,17	12,17		42%
	Additional Activities	0	0,79	0,79		3%
	Support activities	5,32	15,91	21,23		55%
<b>Total Specialist Practitioners - Internist</b>		<b>5,32</b>	<b>28,87</b>	<b>34,19</b>		
Specialist Practitioner - Pediatrician	Main Activities		43,48	43,48		52%
	Additional Activities	0	1,42	1,42		2%
	Support activities	6,69	38,1	44,79		46%
<b>Total Specialist Practitioners - Pediatrician</b>		<b>6,69</b>	<b>83</b>	<b>89,69</b>		
Midwives in the maternity ward	Main Activities	818,15	500,52	1318,67	64%	73%
	Additional Activities	55,19	51,45	106,64	4%	7%
	Support activities	404,63	134,68	539,31	32%	20%
<b>Total Midwives in the maternity ward</b>		<b>1277,97</b>	<b>686,65</b>	<b>1964,62</b>		

Source: survey respondent data

According to Tables 4a and 4b, nurses working in rural dispensaries devote 39% of their working time to main activities, 15% to additional activities and 46% to support activities. Nurses working in urban dispensaries devote 52% of their work time to main activities, 13% to additional activities, and 35% to support activities. The midwives practicing maternity in rural areas devotes 64% to main activities, 4% to additional activities, and 32% to support activities. Midwives who practice maternity in urban areas devote 73% of their work time to main activities, 7% to additional activities, and 20% to support activities.

### 3.4. Workload Pressure

#### 3.4.1. HHR workload pressures in health facilities

Table 5 presents the results of the WISN ratios by HHR category and subsequent interpretations. The WISN ratio is the ratio of required to the available workforce. It is used to assess workload pressure.

Overall, nine HHR categories are below the equilibrium situation while two are above the equilibrium. The WISN ratios calculated from the HHR categories show that internist specialists have a ratio of 0.47 and maternity care assistant have a ratio of 1.40.

#### 3.3.2. Workload Pressure on HHR in Health Facilities by Workplace Setting

Table 6 presents the results of the crossover of work pressure by HHR category and by practice setting.

**Table 5.** Presentation of the WISN ratios of certain categories of HHR in Benin's public sector in 2018

Categories	Staff available	Staffing requirements	WISN Ratio	Interpreting the WISN ratio
Maternity Care Assistant	1013	721	1,40	No pressure
Dispensary Care Assistant	729	769	0,95	High Pressure
Inspector of Health Action Anesthesiologist	72	76	0,95	High Pressure
Nurse at the dispensary	884	936	0,94	High Pressure
General Practitioner Health Centre	38	38	1,00	Equilibre
General Practitioner Hospital	45	47	0,96	High Pressure
Specialist Practitioner - Surgery	51	49	1,04	No pressure
Specialist Practitioner Gynecologist	66	84	0,79	High Pressure
Specialist Practitioner - Internist	9	19	0,47	High Pressure
Specialist Practitioner - Pediatrician	37	69	0,54	High Pressure
Midwife at the maternity ward	926	1652	0,56	High Pressure
<b>Total general</b>	<b>3870</b>	<b>4460</b>	<b>0,87</b>	High Pressure

Source: survey respondent data

**Table 6.** Presentation of WISN ratios by the environment and their interpretations

Corps	Environment									
	Rural					Urban				
	Available manpower	Total required workforce	Difference/ excess	Ratio WISN	interpretation of the WISN ratio	Available manpower	Total required workforce	Difference/ excess	Ratio WISN	interpretation of the WISN ratio
Maternity Care Assistant	512	443	69	<b>1,16</b>	No pressure	501	278	223	<b>1,80</b>	No pressure
Dispensary Care Assistant	504	562	-58	<b>0,90</b>	High Pressure	225	207	18	<b>1,09</b>	No pressure
Inspector of Health Action Anesthesiologist	0	0	0			72	76	-4	<b>0,95</b>	High Pressure
Nurse at the dispensary	475	696	-221	<b>0,68</b>	High Pressure	409	240	169	<b>1,70</b>	No pressure
General Practitioner Health Centre	5	4	1	<b>1,25</b>	No pressure	33	34	-1	<b>0,97</b>	High Pressure
General Practitioner Hospital			0			45	47	-2	<b>0,96</b>	High Pressure
Specialist Practitioner - Surgery	0	0	0			51	49	2	<b>1,04</b>	No pressure
Specialist Practitioner Gynecologist	0	0	0			66	84	-18	<b>0,78</b>	High Pressure
Specialist Practitioner - Internist	0	0	0			9	19	-10	<b>0,47</b>	High Pressure
Specialist Practitioner - Pediatrician	0	0	0			37	69	-32	<b>0,54</b>	High Pressure
Midwife at the maternity ward	318	1017	-699	<b>0,31</b>	High Pressure	608	635	-27	<b>0,96</b>	High Pressure
Total général	1814	2722	-908	<b>0,67</b>	High Pressure	2056	1738	318	<b>1,18</b>	No pressure

The results indicate that the WISN ratio of the nurses practicing in a rural area is 0.68 and that in an urban area is 1.70. The WISN ratio for the rural midwife is 0.31 and the urban midwife is 0.96.

## 4. Discussion

The discussion will focus briefly on the achievement of objectives, the quality and reliability of the results, and the comparison of results with previous works.

This study was an opportunity to calculate the number of health workers per category of health workers needed to cover the workload in Benin's public health facilities. It also made it possible to determine the occupations of the human resources in relation to the three categories of activities, i.e. main, support, and additional activities, in order to deduce the pressure of the workload on the human resources in Benin's health facilities.

The data used for this research were obtained from primary sources, such as registries that may be subjected to transcription bias. However, these errors are minimized by transcription in DHIS2, supervision, and validation of the health statistics directory. Moreover, the quality control of the DHIS2 data allows us to note that any biases cannot be allowed to compromise the quality and validity of the data used.

A comparison of the results of this study, with those of the literature review mentioned above, shows that the study is relevant. It leads to a conclusion that the use of the WISN tool is an opportunity to make a good specification of workload and needs, better projections in terms of planning and deployment of Qualified Health Workers (QHW).

### 4.1. Staffing Requirements for the Workload

The number of staff required to cover the workload related to the demand for care in Benin, two main observations emerge from the application of the WISN method. First, the corps of health care assistants working in maternity wards is highly overstaffed, with more than 292 surplus staff in the country. Second, all the other Health Workers corps studied are in shortage. This overstaffing of nurses' assistants is linked to the recruitment without standards from 1997 to 2008. At that time, with debt remission to the Heavily Indebted Poor Countries, Benin injected the funds from the debt remission into the social sectors (health and education). The Ministry of Health, therefore, decided to recruit Health Workers. This initiative, which should make it possible to provide health facilities with qualified Health Workers, has unfortunately been diverted from its original purpose to serve partisan and courtesan interests, with the recruitment of a large number of nurses' assistants as a result. The shortage situation is much greater for all other Health Workers bodies studied. The corps of midwives practicing in maternity wards is in a shortage situation with a need for 726 midwives; the corps of nurses practicing in a dispensary is in a shortage situation with a need for 52 nurses; the corps of paediatricians is in a shortage situation with a need for 32 paediatricians. This observed shortage is induced by the mismatch between Health Workers training and

recruitment. There are two medical schools and two training institutes for midwives and nurses in the country, and their QHW production capacity is below the country's public and private needs.

A reading of the results, according to the agents' practice environment (urban and rural), shows that the shortage is more pronounced in rural than in urban areas. Apart from nurses who work in dispensaries and midwives who work in maternity wards, the other QHW bodies are almost non-existent in rural areas. This can be explained by the pyramid structure of the health system in place in the country. Because of this structure, the first levels of contact are occupied by nurses and midwives. This gives rise to discrimination in favor of the urban environment, where overstaffing is observed. Recourse to the code of ethics for nurses, inspired by French law, specifies that the nurse applies and respects the protocols drawn up by the doctor and provided by the regulatory provisions.

The rural nurse is alone in meeting the demand for care for a whole year, without the supervision and guidance of a doctor, even though this is provided for in the regulations. As a result, there is an inequity in response to the demand for care. Through the work carried out in Benin in 2018, the authors, after noting the existence of inequity in the distribution of Health Workers, asked themselves what type of equity should be used in the distribution of Health Workers: vertical equity and/or horizontal equity [24]. Other research work has also emphasized the shift from the analysis of inequalities in health to that of inequalities in health opportunities, which better reflects the notion of health equity [25]. In Benin, this high concentration of Health Workers in urban areas is maintained by the failure to comply with the laws and regulations in force. Even the recruitment of new staff in 2014 was unable to keep staff in their posts.

We hope that the reform measures regarding the drafting of a law on the organization of the health system (which never existed), the creation of a regulatory authority for the health system, the departmentalization of recruitment in order to reduce the inequity between rural and urban areas (which could not be done without the law), and a review of the mechanism for recruitment, career management and working hours of health workers recommended by the Government in place since 2016 will provide an effective solution to these shortcomings.

To circumvent this inequity, Namaganda G., & al. recommended the use of WISN for a fair match between workload and human resources [12]. This observation reopened the debate on the issue of health equity addressed by Sossou GA & al. [24] who asked "what is equity in the distribution of the health workforce? ». Better still, they insist on how the distribution of personnel should be done, according to which type of equity: vertical equity and/or horizontal equity? then how the concentration of Health Workers in an urban facility to the detriment of a rural facility is inequitable? In their work, Rochaix L. & al.

concluded that there is no universal answer to characterize equity, but rather that the philosophical framework and values of the society concerned must be taken into account [25].

According to article 8 of the constitution of 11 December 1990 amended by Law 2019-40 of 1 November 2019, the right to health in Bénin is a fundamental right and the vision of the national health policy that was translated into a strategy in the national health development plan (2018-2022) further reinforces this. It was, therefore, believed that it is important to remember that in Benin, in structuring the supply of health care, it is necessary to act through both vertical and horizontal equity and to go beyond. Because of the negative externality of disease and the influence of welfare on economic growth, health equity should be seen as a state's ability to develop and enforce laws and regulations for UHC. The observation that the concentration of QHW in urban areas to the detriment of rural areas, while the workload does not impose it, falls into constitutional illegality and the silence of the central government reflects the weakness of its institutions. It is on the strength of these inadequacies that [26, 27] concluded that workload must be taken into account to meet human resource needs.

The direct consequence of inequity in the distribution of Health Workers is the long waiting time for users of the system and inefficiency. Approaching this question from the angle proposed in previous studies [29, 30] have concluded that there are technical and allocative efficiencies in the allocation of QHHRs. According to the authors, technical efficiency refers to the ability of a health system to produce a better outcome with the same resources, and allocative efficiency refers to the ability of a system to direct its resources in an optimal way. Over-staffing situations are unproductive because there is a mismatch between the workload and the human resources allocated. There is, therefore, technical inefficiency at this level. Deploying health professionals in a health care facility, when the workload does not require it, is also an allocative inefficiency. This inefficiency is twofold because salaries are paid unduly and there are poorly deployed staff, a conclusion that [30] has been reached in a previous study. The shortage situations observed in some places generate sources of both technical and allocative inefficiency. Technical inefficiency is observed at this level in the sense that the work pressure caused by understaffing will have a negative impact on the quality of care for the beneficiaries of health services. The situation of shortage in rural areas leads to poor access to health services despite the high demand [30]. It is, therefore, inferred that both types of inefficiency are present in this study.

However, Paul et al. noted in their work that there is no clear-cut definition of equity in the literature review, but that equity appears to be the balance pursued by universal health coverage, and as soon as health is recognized as a

fundamental right, the search for this balance is imposed on the State [31]. The WHO World Health Report 2008 insists on the need to implement the reforms pertaining to UHC to improve health equity [32].

#### **4.2. Distribution of HHR Working Time in the Public Health Sector**

On the issue of staff occupation, the study found that out of the eleven HHR corps that were the subject of this study, three corps devote more than 50% of their working time to core activities. These are the corps of gynaecological practitioners, midwives working in maternity wards, and IAS-anaesthetists. However, health care assistants in dispensaries, general practitioners in health centers, general practitioners in hospitals, specialist surgeon practitioners, and specialist internist practitioners devote more than 60% of their working time to support activities. The presence or absence of general practitioners influences the workload of nurses and midwives who work alongside doctors, as highlighted in the work on the analysis of efficiency of health expenditure carried out in Benin in 2018, where the authors estimate that the void created by the absence of doctors is filled by the overload of nurses and midwives [30]. In the Beninese context, it is important to make further research to look for the impact of the time spent by medical professionals on their main activities on the quality of care of beneficiaries, particularly on the health of the mother and child. The high maternal, neonatal, and infant mortality rate in the country supports the assertion that most of the main activities are carried out by health care workers on behalf of midwives and nurses.

#### **4.3. Workload Pressure**

On the subject of work pressure, the study revealed that apart from the maternity care assistants, the general practitioners in the health facility and the specialist surgical practitioners have no work pressure. The work pressure is very high among the nursing in dispensaries, the inspector of health action anesthesiologist, general practitioners in hospitals, specialist practitioners in gynaecology and obstetrics, specialist practitioners in internships, specialist practitioners in paediatrics and midwives in maternity wards. An analysis of the results by practice setting shows that work pressure is higher in rural than urban settings for the most common rural HHR bodies. In view of all the above, it can be deduced that Benin's health system at the current stage is fragile. A comparison of these results with the work of Zongo & al. and Tichenor & al. [33, 34] confirms this fragility. Better in the context of health system reform, the diagnosis of the poor performance of the health system in Benin highlights a certain number of factors that further confirm the fragility of the system [4]. It will, therefore, be necessary to carry out far-reaching reforms to strengthen Benin's health system by optimizing

management and reducing low productivity, separating procurement from the supply, in order to achieve significant efficiency gains; this is what Ruff & al. recommend in their work carried out in 2011 in South Africa for the South African health system in order to improve its productivity and responsiveness [35].

A study of Angola, Ethiopia, Mozambique, Rwanda, and Eritrea has shown that reducing real mortality requires action on three fronts: decentralization of health systems, innovation, and health financing [36].

High workload pressure is a source of overexploitation of the human resources involved and affects their own health and the quality of the health services and care they provide. Thus, with the introduction of the health insurance component of the Assurance for ARCH, the financial barriers to the use of health services would be removed. In order to contain the high demand and the sustainability of the measures that will be taken, it will be necessary to work on the production, recruitment, planning, and retention of HHR in their posts. It will also be necessary to ensure a balance between the workload and deployment of QHHRs in health facilities across the country and between services within the same health facility. These precautionary measures are necessary to avoid poor performance achieved in Ethiopia in the wake of the Business Process Reengineering reform [36]. The same caution is recommended with regard to the work of Okuonzi S.A and Esteves, R.J [27, 37].

## 5. Conclusions

The availability of qualified human resources for health is one of the fundamental pillars, indispensable to each country in its progress towards the UHC. This study revealed that the logic of defining and planning Health Workers needs using the WISN tool is very relevant. It also highlighted that the additional Health Workers made available to the health system and the readjustments necessary to have the workforce in line with the workload developed in the country. It has been observed that both technical and allocation inefficiencies are generated by situations of overstaffing, shortages, overload, and poor use of the working time of health professionals. The study also revealed that general practitioners at the health center devote more time to support activities to the detriment of the main activities, whereas medical acts are their responsibility. This situation needs to be studied in more detail in order to see to what proportion the nurse and the midwife work instead of the health center doctor.

The implementation of the reforms undertaken by the government and the strengthening of the mechanisms for regulating the health system should make it possible to optimize both human and financial resources and the quality of care with a view to significantly reduce morbidity and mortality among the population, in general,

and among mothers and children in particular. In its current form, the health system is not in a position to receive a large flow that will be drained by the implementation of the UHC at a national level. This will require sustained support for ongoing reforms and greater investment in the production, recruitment, and retention of QHW.

## Conflict of Interest

The authors do not declare any conflict of interest.

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