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A Workload Indicators of Staffing Need (WISN) based framework and implementation tool for dietitians at South African central and tertiary public hospitals

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Abstract

Background Quality nutrition services are dependent upon the accessibility and availability of nutrition professionals. In this study, we used the World Health Organization's Workload Indicators of Staffing Need (WISN) methodology to develop a dietetic staffing norm framework and implementation tool for South African central and tertiary public hospitals.

Methods We followed the eight step WISN methodology as a basis for this developmental study. National data on permanently employed dietitians in public hospitals were used to determine the facility type. Available working time (AWT) was determined using WISN calculations and SA labour regulations. Consensus on workload components (WC) and activity standards (AS) was achieved through a Delphi exercise. Steps 5 to 8 ended in determination of dietitian requirements based on WISN software. Similar steps were used to develop the framework and tool. The tool's calculated outputs were compared against the WISN software.

Results Central and tertiary public hospitals were identified as the target facilities. Dietitians AWT at these facilities was calculated as 1528 h per year. A final list of 45 WC and aligned AS was obtained and provided the necessary contextualization. A WISN based framework, and a Microsoft Excel tool (calculator) resulted. Calculated average dietitians' requirements were 24.59 and 24.23 for WISN software and the excel tool respectively.

Conclusion The WISN methodology is a versatile tool that allows for the development of context and cadre specific staffing norm implementation frameworks and tools. The developed tool is valid and contextualized to determine the specific need for dietitians at SA central and tertiary public hospitals. These results will help policy makers to plan and forecast dietetic staffing needs at a macro level.

Keywords Dietitian, Framework, South Africa, Staffing norm, Tool, Workload Indicators of Staffing Need

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Background

The importance of a diverse skill-mix among health professionals to ensure delivery of high-quality patient care has recently been emphasized [1–4]. In the World Health Organisation's (WHO) African Region, it is indicated that a density of 0.09 dietitians and nutritionists per 10 000 population are needed to achieve at least 70% universal health coverage [5]. In South Africa, qualified and registered dietitians are key players in the multidisciplinary team given the quadruple burden of diseases which increases the demand for nutrition services [6–9]. As per the regulations defining the scope of profession of dietitians, these health professionals are responsible for optimizing the nutritional well-being of individuals and groups in different settings. This includes the prevention, treatment and management of nutrition related disease [9].

South Africa's, National Health Insurance (NHI) bill aims to provide affordable, quality healthcare services for all regardless of their socio-economic status [10]. To radically transform the healthcare system and enable the NHI, there is a need to invest in the health workforce. To guide investment, a task team was appointed to develop the Human Resource for Health (HRH) strategy addressing various cadres in South Africa but lacked specific data for dietitians [6]. The strategy describes HRH as the "right health workforce needed for an efficient and effective health system, which is critical for attaining the goals of improved population health, responsiveness to patient and community expectations, and ensuring financial risk protection" [6].

Evidence-based HRH planning is essential to determine the optimal balance of dietitians to address staff shortages [11]. These shortages can limit the quality of services offered to patients [12, 13], particularly in the public sector where an unbalanced skill mix, and lack of support staff can lead to a high workload for dietitians. The South African HRH strategy acknowledges the need for national capacity, skills, and credible planning models to address these concerns effectively [6].

The use of traditional methods such as population ratios and health worker density benchmarks have resulted in rigid staffing patterns that do not account for staff workloads or the complexities of population health needs, especially in less developed countries [14–16]. The WHO Workload Indicators of Staffing Need (WISN) introduced in 1998 and revised in 2010 is a method that offers a flexible staffing norm based on health workers' workloads, considering the actual time required to complete workload components [16, 17]. The use of workload-based staffing norms is essential for accurately determining staffing needs at health facility level [17, 18]. Kunjumen et al., 2022 share global experiences on how WISN has assisted with policy decisions regarding the determination of staffing requirements across various levels of care and for various cadres [14]. In addition, a study, by Mabunda et al. [19], recommended the adoption of the WISN method as a modelling tool for South Africa`s staffing requirements, allowing for gradual implementation based on available resources.

Consequently, this study aimed to develop a WISN-based staffing norm implementation framework for dietitians in South African central and tertiary public hospitals. Additionally, we aimed to develop an excel tool based on the generic WISN method that is easy to use for determining dietitians' requirements at these levels.

An evidence-based implementation framework will provide policy makers with tools for policy dialogue, revising current staffing norms, and making informed decisions on staff distribution in South African healthcare settings [2].

Methods

We adopted the WISN approach (Fig. 1) as the conceptual and empirical framework for this study. Data collection and analysis informed the process of developing a tailored end-user implementation framework and excel tool based on the WHO WISN software that incorporates appropriate evidence and data in planning for dietitians in the South African context [16].

Data collection

Data was collected from provincial nutrition managers on the numbers and vacancies of dietitians at all public hospitals in South Africa between September 2021 and January 2022 to identify the priority cadre and health facility type (step 1). We estimated Available Working Time (AWT) (step 2) using the WISN formula (see Eq. 1) and guidance from the South African Basic Conditions of Employment Act [20].

Steps 3 and 4 were completed as part of an online Delphi consensus study to determine a standardized list of workload components (WC) and activity standards (AS) for the priority cadre, reported previously [21]. WISN defines WC and AS as the work activities that consume the most of a health worker's daily working time and are categorized as health service, support service and individual or additional service activities and the time it takes to perform these activities respectively. Briefly, participants of these two steps were all head dietitians of the 21 out of 22 central and tertiary hospitals [21]. Participants were presented with an initial list of the three WC categories generated from nationally representative data of public dietitians' job descriptions. They were required to rate their agreement on the WC on a Likert scale, provide additional items on each WC as necessary

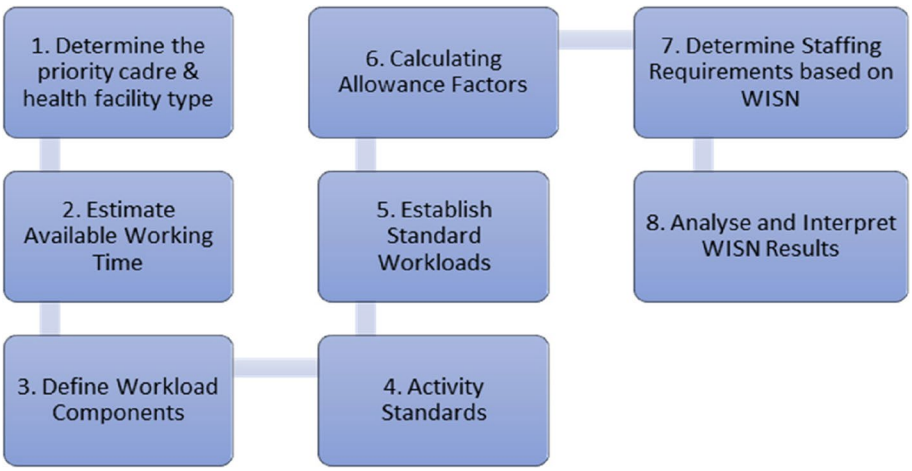

Fig. 1 The World Health Organization Workload Indicators of Staffing Need (WISN) eight step methodology [16]

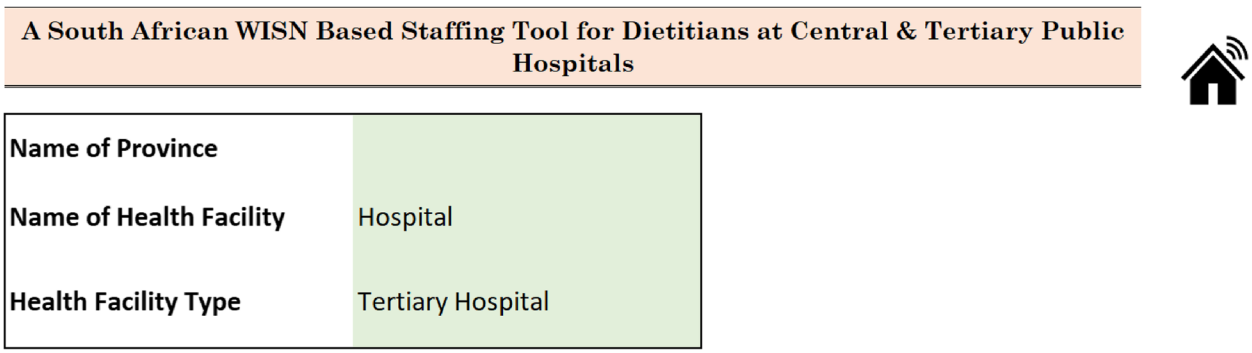

Fig. 2 The facility identification sheet

as well as provide data on AS for each item on the list or additional items. The agreement threshold for each of the WC was set at ≥ 70% and a median was used to determine the AS [21]. The remaining WISN steps (5 to 8) were then applied using the calculations provided in the WHO manual as guidance to develop a WISN based dietetic staffing norm framework for South African central and tertiary public hospitals [16]. This framework was operationalized through the development of a Microsoft Excel implementation tool. The tool's outputs were then compared with those of the WISN software based on similar inputs. Here we concurrently report the results of each step alongside their application to the framework and tool development and characteristics thereof.

Results

Step one: Determine the priority cadre and health facility type

Only central and tertiary hospitals had at least one permanently employed dietitian at each facility, therefore only these two levels were chosen for the purposes of this study. The Excel tool is enabled to allow the user to select the health facility and type (central or tertiary) for all nine South African provinces (Fig. 2).

Step two: Estimation of available working time

According to labor regulations, dietitians may potentially work an average of 8 h a day excluding weekends without considering overtime as aligned to the South African Basic Conditions of Employment Act, 1997 (Act 75 of 1997) (BCEA) [20]. According to best practice, staff who work 8 h a day for 5 days per week across 52 weeks in a year can work on average 173.33 h per month and 21.67 days per month. This translates to a total of 2 079.96 h per annum or 260.04 days per annum. The best practice guidelines do not factor in annual and sick leave entitlements as per Sects. 20 and 22 of the BCEA [20]. According to the WISN methodology, available work time (AWT) should consider the specific contextual

A South African WISN Based Staffing Tool for Dietitians at Central & Tertiary Public Hospitals

Description	Base Value	Minimum Value	Maximum Value	Explamatory Notes
Potential Days per Year	365			
Total Number of Non-Working Days (A)	**174**			
Weekends	104			
Public Holidays	12			
Annual Leave	26	22	30	Values highlighted in blue (column C) may be changed to suit your requirements if the existing values do not apply to your facility.
Certified Sick Leave	12			
Special Leave	10			
Training Days as per personal development plan	10			
Number of Working Hours per Day	8			
Available Working Days per Year	**191**			
Available Working Hours per Year	**1 528**			
Available Working Minutes per Year	**91 680**			

Fig. 3 Available working time

circumstances of employees working at central and tertiary public hospitals as follows [16]:

$$\mathbf{AWT = A - (B + C + D + E + F) \times G} \quad (1)$$

✓ A = 261 possible working days in a year (365 days—52 weekends X 2)
✓ B = 12 statutory public holidays in a year
✓ C = 22 to 30 annual leave days in a year (average 26 days)
✓ D = 12 certified sick leave days in a year
✓ E = 10 training days as per personal development plan
✓ E = 10 training days as per personal development plan
✓ F = 10 special leave days
✓ G = 8 working h in one day

Equation 1 was imputed in the excel spread sheet tool (Fig. 3). Consequently, using the equation we determined the AWT for a permanently employed dietitian at central and tertiary public hospitals as 38 weeks or 191 days translating to 1528 h per year or 91,680 min per year (Fig. 3). Similar results were obtained using the WISN software.

Steps three and four: Workload components and activity standards

Three rounds of Delphi process were done with a 100% response rate and consensus was achieved on 92% of all proposed WC. The process resulted in a standardized list of 45 WISN WC (15 health services, 15 support services and 15 additional/individual services) together with aligned AS [21]. Each of the standardized list of WC and AS was incorporated as fixed components in the framework (Fig. 12) and the excel implementation tool (Figs. 4, 5 and 6).

Steps 5, 6, 7, and 8: Standard workloads, allowance factors, and staffing requirements

Individual health service statistics are required in the WISN software calculations. Health service statistics is the number of patients consulted by the health worker (dietitians) for each health service activity per annum [16]. The excel tool was thus coded to enable entry of health statistics data (Fig. 7). It is at this stage that the tool accommodates for the individual workloads of each facility because these health statistics can vary between facilities [14, 16].

The WISN software calculates the standard workloads, allowance factors, and determines the staffing requirements for specific cadres [14, 16]. Consequently, these same steps were incorporated and coded into the excel tool. We incorporated the WISN formula for standard workloads for each of the 15 health service activities published in Naicker et al. [21] (see Fig. 8). Standard workload is the amount of work associated with one activity that one dietitian could do in a year. Standard workload is calculated as AWT divided by the activity standard of a particular task [16].

$$\text{Standard workload} = \text{AWT/activity standard} \quad (2)$$

A South African WISN Based Staffing Tool for Dietitians at Central & Tertiary Public Hospitals

Code	Health service activities	Activity standards	Explanatory notes
HSA1	Ward rounds (individual and multidisciplinary)	10	
HSA2	Patient screening	5	
HSA3	In Patient consultation and treatment (New)	30	
HSA4	In patient nutritional assessment (ABCDE) & diagnosis (New)	15	
HSA5	In patient calculation of nutritional requirements & development of nutrition intervention plans (New)	15	
HSA6	In patient nutrition support and dietary counseling (New)	30	
HSA7	In patient consultation and treatment (FU)	15	These health service activities are fixed and may not be changed or removed.
HSA8	In patient referral, communication with the multidisciplinary team and related activities	10	
HSA9	Outpatient consultation and treatment (New)	45	
HSA10	Outpatient nutritional assessment (ABCDE) & diagnosis (New)	15	
HSA11	Outpatient nutritional plan and Intervention including dietary counseling (New)	30	
HSA12	Outpatient consultation and treatment (FU)	30	
HSA13	Outpatient /specialist clinics (cerebral palsy, diabetes etc)	45	
HSA14	Report writing and patient notes	15	
HSA15	Referral process including writing of letters (between health facilities)	10	
HSA16			Other health service actvities may be added in the green highlighted rows if applicable to your facility
HSA17			
HSA18			
HSA19			

Fig. 4 Heath service activities

Code	Support activities	Hours per year	Explanatory notes
SA1	Food service management (developing and updating of cycle menus, therapeutic diets & related diet sheets)	24	These support service activities are fixed and may not be changed or removed.
SA2	Development and review of policies, protocols and guidelines (including related IEC materials)	36	
SA3	Dietetics departmental meetings	38	
SA4	Hospital committee/ internal stakeholder meetings	44	
SA5	Meetings with industry representatives and other external stakeholders	18	
SA6	Own performance development and management system (PMDS) reporting	8	
SA7	CPD activities	24	
SA8	Participation in journal reviews and working groups	38	
SA9	In-service training to the multidisciplinary team (nurses, doctors etc)	12	
SA10	In-service training to the food service team	8	
SA11	Students mentoring (training), evaluation & reporting (including meeting with universities and accrediation of facilities)	90	
SA12	Attend training (generic)	18	
SA13	Recordkeeping, statistics & report writing	48	
SA14	Peer reviews and clinical audits	24	
SA15	Outpatient health awareness events/campaigns/open days (planning and participation)	20	
	Total hours per annum	**450,00**	

Fig. 5 Support service activities

Support service and additional service activities were also included in calculating total workload because dietitians do not only perform health service activities. Therefore, allowance standards for support service and additional service activities as per Naicker et al. [21] were also included.

Code	Individual/additional Activities	Hours per year	Number dietitians performing the additional activities	Explanatory notes
AA1	Managerial duties (risk management, financial management (budgeting and procurement), asset management, planning of duty rosters)	24	1	These additional service activities are fixed and may not be changed or removed. You may only add the number of dietitians that are responsible for each of these activities in column E
AA2	Audits (stock take and stock take audits, diet sheet audits, equipment audits etc)	24	1	
AA3	Develop and review departmental plans (strategic, business and operational)	16	1	
AA4	Evaluate and monitor the implementation of policies/strategies/guidelines/protocols and norms and standards	24	1	
AA5	Report writing, validations and presentations	36	6	
AA6	Human resource management (recruitment, selection of new staff, grievances and disciplinary processes, HPCSA registration & compliance, attendance and leave register)	48	1	
AA7	Orientation of new staff, training, support and supervision of lower level staff and community service dietitians	191	1	
AA8	Performance development and management system (PMDS)	20	1	
AA9	Participation in research activities	24	6	
AA10	National core standards (QIP)-develop plans, evaluation and reports	19	1	
AA11	Planning and coordination of departmental meetings	36	1	
AA12	District, provincial INP and allied Meetings	24	2	
AA13	MBFI mentor/committee participation and activities	24	1	
AA14	Education, training and supervision of foodservice/diet kitchen staff/milk kitchen/tube feed personnel	53	6	
	Total hours per annum	**563**		

Fig. 6 Individual/additional service activities

A South African WISN Based Staffing Tool for Dietitians at Central & Tertiary Public Hospitals

Code	Health service activities	Health service statistics	Explanatory notes
HSA1	Ward rounds (individual and multidisciplinary)	37056	Health service statistics are required for each health service activity based on annual patient statistics.
HSA2	Patient screening	37056	
HSA3	In Patient consultation and treatment (New)	11642	
HSA4	In patient nutritional assessment (ABCDE) & diagnosis (New)	37056	
HSA5	In patient calculation of nutritional requirements & development of nutrition intervention plans (New)	2509	
HSA6	In patient nutrition support and dietary counseling (New)	833	
HSA7	In patient consultation and treatment (FU)	25414	
HSA8	In patient referral, communication with the multidisciplinary team and related activities	192	
HSA9	Outpatient consultation and treatment (New)	1124	
HSA10	Outpatient nutritional assessment (ABCDE) & diagnosis (New)	2301	
HSA11	Outpatient nutritional plan and Intervention including dietary counseling (New)	2301	
HSA12	Outpatient consultation and treatment (FU)	1178	
HSA13	Outpatient /specialist clinics (cerebral palsy, diabetes etc)	531	
HSA14	Report writing and patient notes	39357	
HSA15	Referral process including writing of letters (between health facilities)	70	
HSA16	-		
HSA17	-		
HSA18	-		
HSA19	-		
HSA20	-		

Fig. 7 Health Service statistics

Category allowance factors were calculated for each support service activity (Fig. 9). The WISN calculates the category allowance standard (CAS) as the total percentage of time spent on all support service activities in a year. Next, the tool was coded to calculate the total number of dietitians required to perform health service and support service activities using the category allowance factor (CAF) [16]. The CAF was incorporated into the tool using the following formula:

$$\mathbf{CAF = 1/[1 - (TOTAL\ CAS\ /100)]} \quad (3)$$

We added the individual allowance standard (IAS) which was the total time certain dietitians took to perform all additional activities in a year (Fig. 10). The total

Health service activities	Activity standard	Standard workload	Staff required for activity (in FTE) - [A]
Ward rounds (individual and multidisciplinary)	10	9 168	4,04
Patient screening	5	18 336	2,02
In Patient consultation and treatment (New)	30	3 056	3,81
In patient nutritional assessment (ABCDE) & diagnosis (New)	15	6 112	6,06
In patient calculation of nutritional requirements & development of nutrition intervention plans	15	6 112	0,41
In patient nutrition support and dietary counseling (New)	30	3 056	0,27
In patient consultation and treatment (FU)	15	6 112	4,16
In patient referral, communication with the multidisciplinary team and related activities	10	9 168	0,02
Outpatient consultation and treatment (New)	45	2 037	0,55
Outpatient nutritional assessment (ABCDE) & diagnosis (New)	15	6 112	0,38
Outpatient nutritional plan and Intervention including dietary counseling (New)	30	3 056	0,75
Outpatient consultation and treatment (FU)	30	3 056	0,39
Outpatient /specialist clinics (cerebral palsy, diabetes etc)	45	2 037	0,26
Report writing and patient notes	15	6 112	6,44
Referral process including writing of letters (between health facilities)	10	9 168	0,01
0	0	0	0,00
0	0	0	0,00
0	0	0	0,00
0	0	0	0,00
0,00	0	0	0,00
Total minutes per patient		**92 699**	**29,57**
Total hours per patient			

A

Fig. 8 Standard workloads

Support activities	Support activity standards	Category allowance standard	Category allowance factor - [B]
Food service management (developing and updating of cycle menus, therapeutic diets & related diet sheets)	24	1,6%	1,016
Development and review of policies, protocols and guidelines (including related IEC materials)	36	2,4%	1,024
Dietetics departmental meetings	38	2,5%	1,026
Hospital committee/ internal stakeholder meetings	44	2,9%	1,030
Meetings with industry representatives and other external stakeholders	18	1,2%	1,012
Own performance development and management system (PMDS) reporting	8	0,5%	1,005
CPD activities	24	1,6%	1,016
Participation in journal reviews and working groups	38	2,5%	1,026
In-service training to the multidisciplinary team (nurses, doctors etc)	12	0,8%	1,008
In-service training to the food service team	8	0,5%	1,005
Students mentoring (training), evaluation & reporting (including meeting with universities and accrediation of facilities)	90	5,9%	1,063
Attend training (generic)	18	1,2%	1,012
Recordkeeping, statistics & report writing	48	3,1%	1,032
Peer reviews and clinical audits	24	1,6%	1,016
Outpatient health awareness events/campaigns/open days (planning and participation)	20	1,3%	1,013
Total hours per annum	450	29,5%	1,417

B

Fig. 9 Category allowance factors

IAS would be used to calculate individual allowance factor (IAF) which is the staff required to cover additional activities of certain dietitians as follows [16]:

$$\textbf{IAF} = \textbf{Total IAS/AWT} \quad (4)$$

IAF was a factor that was added to the total calculation and was not a multiplier such as the CAF [16].

Finally, staffing requirement was incorporated using the following formula:

$$\textbf{Number of dietitians} = (\textbf{A X B}) + \textbf{C} \quad (5)$$

where:

- A = staffing required for health service activities (Group A)
- B = CAF (Group B)
- C = IAF (Group C)

At this stage the tool (calculator) is complete, and the user can determine the number of required dietitians in relation to the number of currently employed dietitians, allowing one to assess the degree of under or over staffing (Fig. 11).

$$\textbf{WISN difference} = \textbf{Current number of dietitians} - \textbf{required number of dietitians} \quad (6)$$

Individual/additional Activities	Number of dietitians performing the additional activities	Individual allowance standard	Individual allowance factor - [C]
Managerial duties (risk management, financial management (budgeting and procurement), asset management, planning of duty rosters)	1	24	0,016
Audits (stock take and stock take audits, diet sheet audits, equipment audits etc)	4	96	0,063
Develop and review departmental plans (strategic, business and operational)	1	16	0,010
Evaluate and monitor the implementation of policies/strategies/guidelines/protocols and norms and standards	2	48	0,031
Report writing, validations and presentations	1	36	0,024
Human resource management (recruitment, selection of new staff, grievances and disciplinary processes, HPCSA registration & compliance, attendance and leave register)	1	48	0,031
Orientation of new staff, training, support and supervision of lower level staff and community service dietitians	6	1146	0,750
Performance development and management system (PMDS)	1	20	0,013
Participation in research activities	1	24	0,016
National core standards (QIP)-develop plans, evaluation and reports	1	19	0,012
Planning and coordination of departmental meetings	1	36	0,024
District, provincial INP and allied Meetings	2	48	0,031
MBFI mentor/committee participation and activities	6	144	0,094
Education, training and supervision of foodservice/diet kitchen staff/milk kitchen/tube feed personnel	6	318	0,208
Total hours per annum		**2023**	**1,324**

Fig. 10 Individual allowance factors

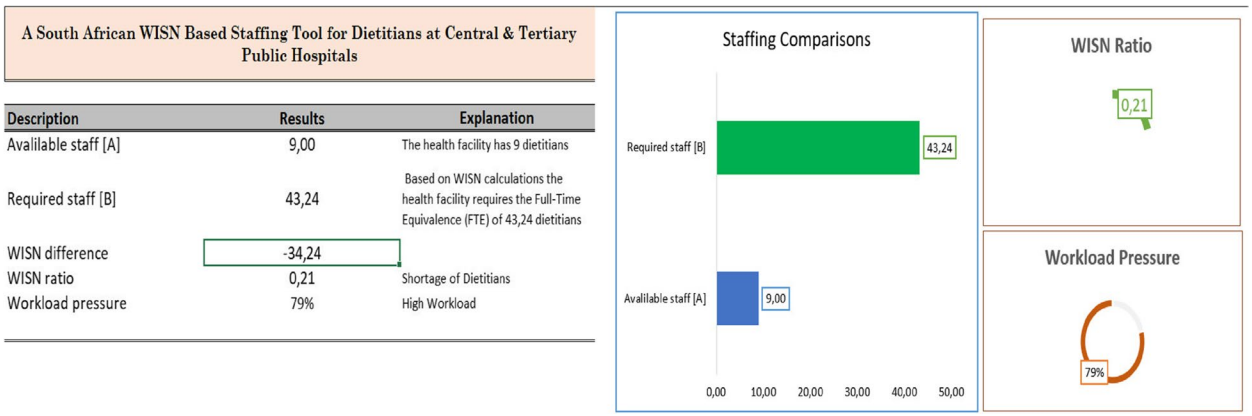

Fig. 11 Summary dashboard with WISN calculated results

The tool further allows for the calculation of the WISN ratio as a proxy measure providing an indication of work pressures (Fig. 11) [16].

$$\textbf{WISN ratio} = \textbf{Current number of dietitians/required number of dietitians} \quad (7)$$

where, according to WISN [16]:

A ratio of more than 1 = over staffing

A ratio of equal to 1 = adequate staffing

A ratio of less than 1 = under staffing

The developed staffing norm framework and implementation tool

The developed framework is shown in Fig. 12. This framework illustrates the use of the eight step WISN methodology and how it has been contextualised for dietitians at South African central and tertiary public hospitals. Each of the steps shown in the framework have been operationalised in the development of an implementation tool.

The developed South African excel implementation tool uses the same formula as those used in the WISN software as per the WISN user's manual [16]. The tool has a user-interface sheet (dashboard) which allows for easy navigation between the excel spreadsheets (Fig. 13). The user is required to follow the sequence of the icons depicted on the interface sheet (essential inputs, detailed computations and summary outputs). The tool is accompanied by instructions for use which can be assessed using the link on the interface sheet (Fig. 13). Users can

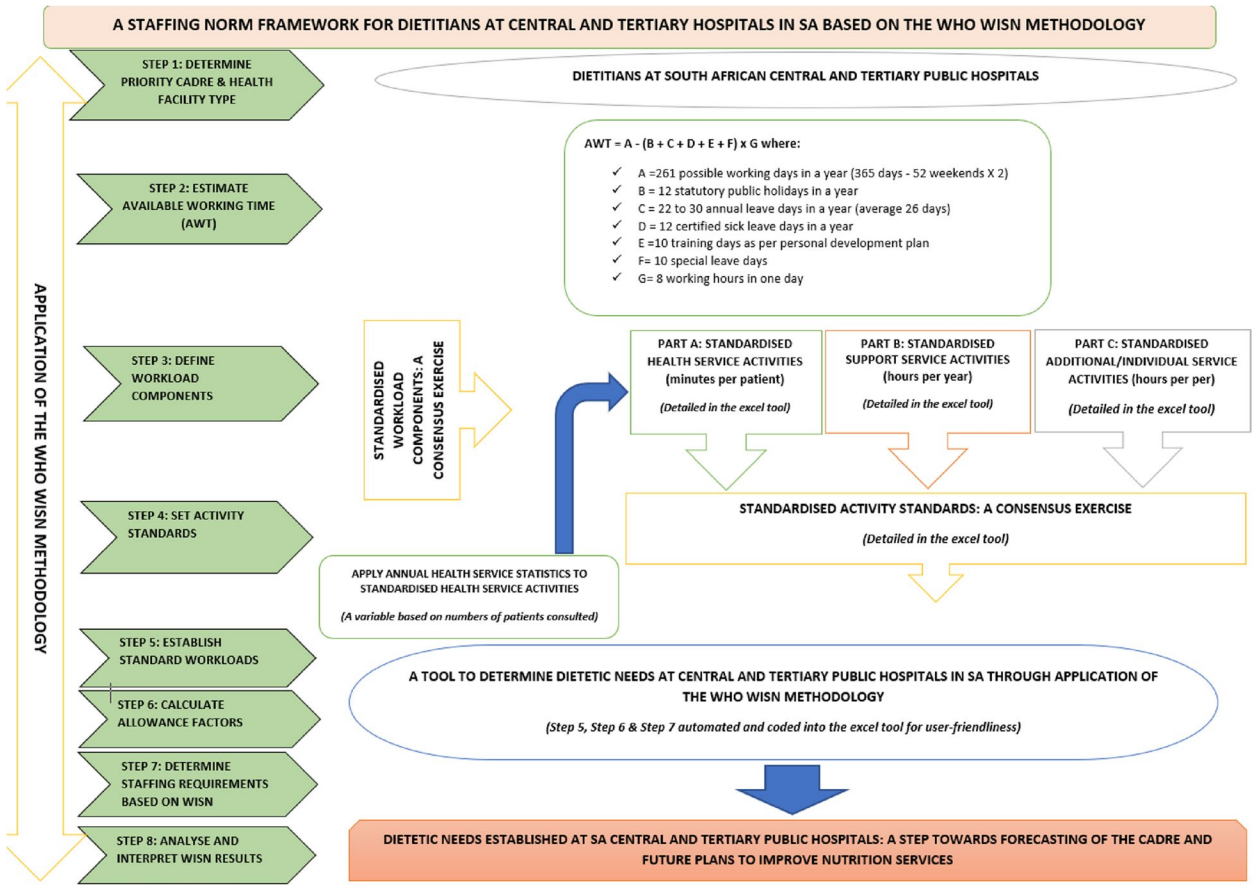

Fig. 12 A WISN based staffing norm framework for dietitians at South African central and tertiary public hospitals

input the required data to calculate staff requirements and get summary outputs as shown in Fig. 11.

Comparison of staff requirements based on the SA tool against the WISN software

The results obtained using the two tools (WHO WISN software and South African excel tool) for the 21 central and tertiary hospitals are presented in Table 1. The WHO WISN software calculated that on average 24.59 dietitians need to be employed at each hospital, whilst the South African Excel tool calculated this value at 24.23. On average, the WHO WISN software value and the South African Excel tool value differed by 0.36, representing a percentage deviation of 1.46. Based on this small percentage deviation, our results suggest that the South African Excel tool can be used in the South African context.

Discussion

The eight step WISN methodology proved useful and effective for developing a staffing norm framework and excel implementation tool for dietitians in South Africa. The WISN is a relatively simple method to determine HRH but requires a good understanding of the methodology to accurately implement and complete the necessary calculations [2]. The computerization of WISN in 2010 further improved its usability, and the tool has been adapted for different contexts, several HRH cadres, and across various levels of health care [2, 14]. Facilities do not work in isolation but form part of an integrated health system, thus standardized macro level data can be valuable in strengthening staff projection and forecasting at a country level [2].

The WISN has been implemented in South Africa across a range of cadres at the same time bringing with it affordability challenges [19]. WISN experts advise starting with a few cadres and facilities before implementing the WISN at a large scale [14]. Therefore, the South African framework developed in this study (Fig. 12) provides a WISN based guide supported by an excel implementation tool specific to a certain cadre and health facility type. This framework allows for standardization of HRH for dietitians (specific cadre), at central and tertiary hospitals (health facility

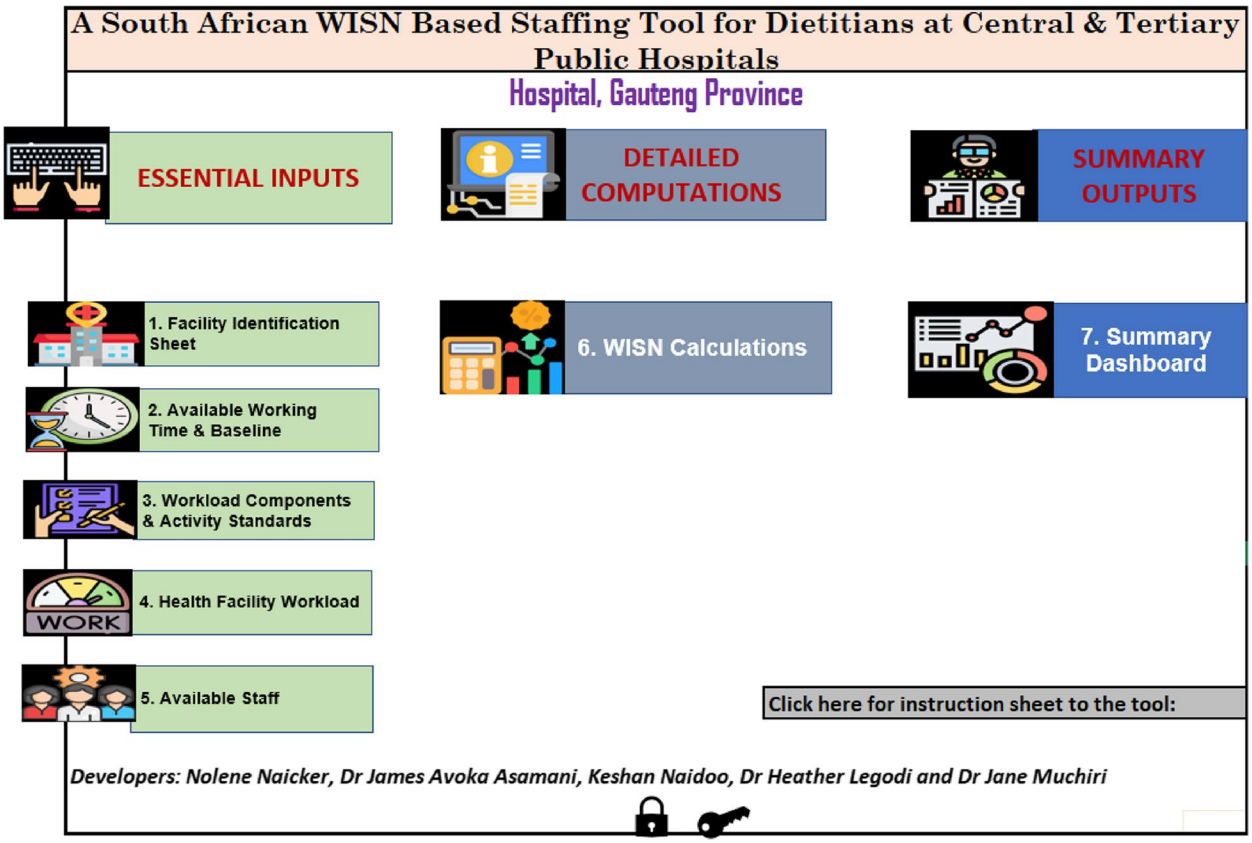

Fig. 13 The user-Interface Sheet of the South African WISN based staffing tool for dietitians at central and tertiary public hospitals

type), AWT, WC, and AS. In our study, we found that it was not possible to standardize the dietetic staffing workloads for different hospitals as staffing workloads depend on health service statistics [4, 22]. Health service statistics vary according to the number of current dietetic staff, geographical location, and catchment population. Hence, the framework and implementation tool accounts for variations in standard workloads, meeting the individual and unique dietetic staffing needs of each hospital whilst still able to standardise on certain elements [22].

The WHO WISN software has automated the WISN steps allowing for easier calculation of workloads (step 5), allowance factors (step 6), and the determination of staffing needs (step 7) [14]. In this study, we developed the South African implementation tool which uses the same WHO WISN methodology to calculate staffing needs, whilst allowing for user friendliness. The excel tool includes the standardized components (Steps 1, 2, 3 and 4) as fixed features for use at all central and tertiary public hospitals. When using the WHO WISN software, individual facilities are required to undertake these four steps. Therefore, the developed tool is advantageous because it eliminates this additional work.

From step 5 onwards the tool becomes individualized for each hospital, allowing users to input health service statistics and determine actual staffing workloads for each hospital. This allows for the determination of specific dietetic staffing needs based on specific patient data and actual workloads but constructed on standardized AWT, WC, and AS for the central and tertiary health care level in South Africa [2, 21]. A comparison of the hospital staffing requirements calculated using the two tools showed a percentage deviation of less than five, suggesting that the South African tool is a valid tool for use in South Africa. This contextualized tool aims to allow for standardization where possible and to reduce the amount of data input, making for easier implementation at a national level, whilst focusing on one cadre and facility type at a time.

Conclusion

This study demonstrates the versatility of the WISN methodology and its ability to be adapted for the dietetic cadre in South Africa by developing a national

Table 1 Comparison of staff requirements based on the SA tool against the WISN software

Hospital	WISN Software (A)	SA Tool (B)	Absolute Deviation (A-B)	Percentage Deviation (Absolute deviation/A × 100)
A001 TH	37.67	37.17	0.50	1.33
A002 TH	22.89	22.60	0.29	1.27
A003 TH	14.87	14.71	0.16	1.08
A004 TH	13.96	13.81	0.15	1.07
A005 TH	15.92	15.74	0.18	1.13
A006 TH	33.61	33.20	0.41	1.22
A007 TH	19.23	19.01	0.22	1.14
A008 TH	34.83	34.41	0.42	1.21
A009 TH	5.84	5.78	0.06	1.03
A0010 TH	30.70	30.30	0.40	1.30
A0011 TH	44.73	43.24	1.49	3.33
A0012 TH	27.47	27.14	0.33	1.20
A0013 TH	24.26	23.94	0.32	1.32
A0014 TH	10.22	10.10	0.12	1.17
A0015 TH	12.08	11.94	0.14	1.16
AOO1 CH	15.95	15.77	0.18	1.13
A002 CH	36.58	36.11	0.47	1.28
A003 CH	20.54	20.26	0.28	1.36
A004 CH	37.90	37.40	0.50	1.32
A005 CH	38.39	37.90	0.49	1.28
A006 CH	18.65	18.40	0.25	1.34
OVERALL AVERAGE	24.59	24.23	0.36	1.46

staffing norm framework and implementation tool whilst still accounting for the variations in workloads. The developed tool was made functional by applying the generic WHO WISN methodology yet contextualized to determine the specific need for dietitians at South African central and tertiary public hospitals [6]. The framework aims to help policy makers and managers at central and tertiary hospitals in reviewing current staffing requirements and for future planning, modelling, and forecasting of dietetic HRH. Similar frameworks and tools may be useful for district, regional, and specialized levels of care in the future. This exercise was useful in demonstrating that the generic WHO WISN software can be used to develop more user-friendly, cadre and context specific frameworks by standardizing certain data elements in allowing for better implementation.

Abbreviations

AS Activity standard
AWT Available working time
BCEA Basic conditions of employment act
CAF Category allowance factor
CAS Category allowance standard
HRH Human resources for health
IAF Individual allowance factor
IAS Individual allowance standard
NHI National health insurance
WC Workload component
WHO World health organization
WISN Workload indicators for staffing need

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Authors' contributions

VNN, HL and JM were responsible for the conceptualization and design of the study. HL and JM supervised data collection and analyses. VNN, HL, and JM contributed to the drafting, writing, and editing of this paper. VNN, HL, JM and KN contributed towards the development of the Excel Tool. KN was responsible for the critical review of the draft manuscript. All authors read, reviewed, and approved the article. VNN, HL, and JM were responsible for the conceptualization and design of the study. HL and JM supervised data collection and analyses. VNN, HL and JM contributed to the drafting, writing, and editing of this paper. KN was responsible for the critical review of the draft manuscript. All authors read, reviewed and approved the article.

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Data availability

Data is provided within the manuscript.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained through the Research Ethics Committee, Faculty of Health Sciences at the University of Pretoria (Ethics Number: 97/2021). All

procedures were performed in accordance with the Helsinki Declaration. The study was registered and approved for data collection via the National Health Research Database. Study participants were provided with a formal letter detailing the study and invited to participate in the study. All participants signed an informed consent form prior to the commencement of study. Consent to participate was completely voluntary. Only consenting individuals were included in the study.

Consent for publication

Consent for publication was obtained through the South African National Health Research Database, corresponding provincial research committees and hospital research committees where applicable. Patients were not included in this study and thus patient consent was not applicable.

Competing interests

The authors declare no competing interests.

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