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Design and Validate a Tool for Measuring Infrastructure of Nursing Work Environment in Egypt

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Abstract
Background: *Infrastructure reform of nursing work environment in Egypt is becoming an imperative issue for healthcare organizations. Where, efforts are exerted worldwide for improving nations' health and nurses as key role players and most consistent fellow of the multidisciplinary team are profoundly important in healthcare field. Therefore, attention from hospitals to create a healthy environment where nurses are comfortable working will promote competencies needed for improving present and prospect targeted healthcare quality.*
Aim: *The study aims to design and validate a compatible tool to measure Infrastructure of nursing work environment across various hospitals within the scope of the Egyptian healthcare services sectors located in Cairo and Giza.*
Methods: *A methodological study design was executed in five hospitals affiliated to different types of healthcare sectors in Egypt, which include Governmental, Parastatal, Private and Public Sectors. The total numbers of participants were composed of (220) nurses' selected using stratified random sample from each hospital and a panel of experts to validate the constructed tool (Infrastructure of the Nursing Work Environment "INWE"), which comprised of 63 items distributed over 9 subscales dimensions.*
Results: *Face and content validity of the new constructed scale were determined by a judge's panel of 9 experts and 15 experienced nurses. A total of 65 items remained in the final draft after exclusion of irrelevant and ambiguous items. Construct validity was demonstrated for 63 items by using Explanatory Factor Analysis (EFA) method, with loading value above 0.40 and Eigenvalue above one. A high level of internal consistency reliability for the total items was confirmed with Cronbach's alpha coefficient 0.97 and for its nine subscales sets (r = 0.94) and loading value ranged from 0.80 to 0.92*
Conclusion: *The scale developed in this study is acceptable index for measuring the factors that bear on the infrastructure reform of the nursing work environment.*
Recommendation: *Reforming infrastructure of nursing work environment is an essential matter if we demand to move up with human rights either for patients or nurses caring them. Reapplication of the new developed tool in other stratified healthcare facilities in urban, suburban, and rural governates would offer data that can help in improving its psychometric characteristics and to implement exclusive reform programs for nursing profession in all healthcare sectors.*

Key Words: *Infrastructure Reform, Nursing Work Environment, Egyptian Healthcare Services Sectors.*

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I. Introduction

Nursing for Egypt is one of the skilled occupations that have experienced minimal change over the last 30 years. The main challenges in nursing are focused on education, performance and adaptation, a largely unappreciated image, and poor encouragement and motivation due to lower salaries and benefits. The feeble in nurses as a result of nursing laws and legislation have left nurses with minimum social benefits and human privileges. Nurses overwhelmingly face difficult working conditions with little respectful workplace or support. Scarceness of supplies prevents the provision of quality health services. The number of available nurses is insufficient to adequately involve all health services, causing poor distribution of nurses in various health services, erroneous image, wrong public conception and knowledge of the nurses' value, and hardness in dissemination of newly updated technical and non-technical information ***(World Health Organization (WHO), 2012).***

Nursing work environment are characterize with some major factors like nurse autonomy, nurse staffing, and collaboration with physicians. Many studies have centralized on the measurement of such factors for example: The Nursing Work Index ***(Kramer and Hafner, 1989)***, the Practice Environment Scale ***(Lake, 2002)*** and the Essentials of Magnetism ***(Kramer and Schmalenberg, 2004).*** A healthy work environment is a favorable environment when the needs of healthcare professionals, patients, patients' families, clients, and employees are both effectively met. It includes systems, structures, strategies, policies, and procedures. Experimentally it can be measured ***(McPeck, 2016).*** A healthy work environment is described as the place wherein leaders offer the systems, structures, strategies, policies, and procedures that empower nursing staff to engage in the work field and interactive relationships that provide safe and best quality patient care outcomes ***(Schmalenberg and Kramer, 2008).***

A holistic approach of quality predictors of nursing practice outcome take into consideration both individual and environmental factors ***(Rees et al., 2015).*** Recent studies proven that nurses, in addition to other healthcare teams, are generally advocated to have interaction in personal techniques to hold resilience with constrained attention to the function of environmental factors in the place of job ***(Lowe, 2013 & Breen et al., 2014).*** The literature determined a number of environmental factors that have been considered essential in providing supportive and productive work environment for nurses. These factors of workplace were clinical supervision, education, mentoring, training, relational, staffing degree, self-care and personal safety ***(McCann et al., 2013 & Wallbank, 2013).***

A relevant issue in the dilemma on quality assessment is whether the quality of nursing is certainly lower in some hospitals in comparison with other hospitals or whether the differences reflect the organizational characteristics of hospitals. In medical literature, proof has been observed for associations between hospital performances on a standardized set of indicators of medical operations and numerous hospital characteristics ***(Ukawa et al., 2014).***

Ministry of health has to establish and expand an powerful legislation framework advocated by means of sound regulation, discover areas for first-class development and offer steering for the development of exceptional improvement applications within the healthcare system management, maintain crucial linkages domestically, regionally and across the world, ensure safe practices provided by nurses and other healthcare teams and continuously improve healthcare delivery system ***(Ministry of Health and Population (MOHP), 2014).***

In 1997, Egypt created Health Sector Reform Program (HSRP). Its aims are to establish a valid and incorporatedhealthcare system that can operate a market place-oriented services. The major goals are; to maximize coverage and accessibility to holistic quality healthcare at the primary and secondary levels to reach standardized coverage, to emphasize decentralization and authorization at governorate and district levels and to rationalize community health expenditure ***(MOHP, 2014).***

Adopted Scales Background

Kramer and Hafner (1989) developed the Nursing Work Index (NWI) to measure the conception of an environment guiding to quality nursing care. The authors developed sixty five items measured four dimensions. The scale was amended and changed for ten clinical settings in 5 countries and translated into three languages. The sixty five items of NWI was constructed to be an all-inclusive listing of factors that have impact on staff nurses motivation and perception related work productivity. Also, the factors have originated from the characteristics of the forty one magnet hospitals and twenty years of last literature on job satisfaction and work value. The attained cronbach's alpha was 0.89.

Aiken and Patrician (2000) revised the NWI to measure characteristics of professional nursing practice environments. The authors selected fifty six out of the sixty five items for the NWI-R to characterize an environment supportive of nursing practice. An additional item was created about team nursing. Four 4 subscales are structured: autonomy, control over work environment, relationship with physicians, and organizational support of caregivers.

Erickson et al. (1998) developed the original Professional Practice Environment (PPE) with thirty five items. The scale underwent revision in 2005 (RPPE) with forty two items in length. This scale was constructed to measure 8 clinical practice environment characteristics: control over practice, leadership and autonomy in clinical practice, teamwork, staff relationships with physicians, handling disagreement and conflict, communication about patients, cultural sensitivity internal and work motivation, to evaluate the effectiveness of the magnet hospital professional practice environment in acute care setting.

Lake (2002) developed the Practice Environment Scale of the Nursing Work Index (PES-NWI), to measure nursing practice environments. ***Lake*** selected forty eight of the sixty five items measured 5 factors subscales: staffing and resource adequacy, nurse participation in hospital affairs; nurse manager ability, leadership, and support; nursing foundations for quality of care; and nurse-physician relations.

Estabrooks et al. (2002) constructed the Practice Environment Index (PEI) from the R-NWI items. The authors analyzed forty three items applicable to the social organization of nurses work setting and generated a twenty six-item with one-factor solution instrument.

Kramer Marlene & Schmalenberg Claudia, (2002)developed the Essential of Magnetism (EOM) tool that measures 8 attributes (characteristics) clarified by nurses of a satisfying work environment and nursing productivity in magnet hospitals as essential to quality patient care.These attributes are: Support for education, Collegial/collaborative nurse-physician, Working with clinically competent coworkers, and interdisciplinary relationships, Control over nursing practice, Autonomous nursing practice, Supportive nurse managers, Perceived adequacy of staffing, and culture in which patient concern is utmost.

Significance of the study

It was important to construct an Egyptian version assessment scale of Infrastructure of Nursing Work Environment (INWE) to draw up the road map for reforming and reshaping nursing work infrastructure in different health services sectors in Egypt to investigate and measure the infrastructure reform reliable dimensions and studious factors which are major for providing of quality nursing and patient care, job satisfaction, and work productivity that are essentials for patients' outcomes.

Aim of the study

This study conducted to design a tool tomeasure the infrastructure of the nursing work environment across various hospitals within the healthcare services sectors in Egypt through:

- Design an Egyptian version scale of Infrastructure of Nursing Work Environment (INWE).
- Testvalidity and reliability of the new constructed scale.

Research Question

Is the infrastructure of the nursing work environment can be measured or not?

II. Material and Methods

Research Design

A methodological study was conducted with twostages; first for designing and then, to test the validity and reliability of the instrument measure constructs used as variables in the research.

Study Setting

The study was conducted infive hospitals, each hospital affiliated to different type of the healthcare sectors available in Egypt:

1. Governmental Sector
    a. Ministry of Health (MOH)
        - Dar Al Salam Hospital "Harma".
    b. Parastatal
        - Insurance Hospital (Al-Naser Hospital)
        - Teaching Hospital (Souad Kafai Hospital)
        - Curative Care Organization (Mabaret Misr El Kadema)
2. Private Sector
        - Dar Al Fouad Hospital.
3. Public Sector Agencies
        - Military Hospital.

Subjects

The study subjects composed of a panel of expert group, a jury group and a group of staff nurses for concurrent validity and reliability of the designed tool for measuring infrastructure of the nursing work environment,. A panel of experts comprised of 15 senior registered nurses and managers from hospitals representing a diverse healthcare sectors in Egypt, with the only inclusion criterion of three years of experience

in their positions. In addition to 9 professors as jury group was chosen from Nursing Faculties in Cairo, Ain Shams, and Helwan universities both affiliated to the ministry of higher education.

The second group consisted of (300) nurses, were selected using stratified random sample over five groups; each group of nurses were surveyed for at least one year of experience from each hospital in the previously mentioned setting and available at the time of data collection. The final number of all completed questionnaires was 220 with response rate 73.3% for the total completed questionnaires (39 questionnaires were not returned and 41 sheets with missing value were excluded from the study).

Tools of Data Collection

Materials

The researchers of this study intended to use the exact (RPPE) scale and its scoring system, after obtaining permission from the author, then used the scale with a group of experienced nurses (15) and found that the scale did not give clues to what intended to measure. Therefore, the researchers translate the tool into Arabic language and piloted it again with the same group of nurses. The researchers explored that the translated tool was still unclear and difficult to be understood. Thus, the researchers desired to search for the original tool of the Nursing Work Index (NWI) and its revised scale and translated it into Arabic language and piloted it again with the same group of nurses, partial understanding was met.

Finally, the researchers found that this conflict might be solved by constructing new version through reviewing of the most articles related to Nursing Work Environment (NWI), Professional Practice Environment (PPE) and studying all of the scales used in the same field to give clear meanings and comprehended matching of Egyptian culture when translated to Arabian language. The new constructed tool was defined as Infrastructure of Nursing Work Environment (INWE). This tool was designed and validated by the researchers after reviewing the relevant literature to measure infrastructure of the nursing work environment across various hospitals within the Egyptian health services sectors. Its main construction was based on Revised Nursing Work Index (NWI-R) for ***Kramer and Hafner, (1989),*** and its derivative scale, the Professional Environment Scale (PES-NWI) for ***Lake, (2002).***

Infrastructure of Nursing Work Environment (INWE) scale consisted of two parts:

The first part: Demographic data of subject characteristics such as age, sex, years of experience, nursing qualifications, post, work unit, and hospital type.

The second part: Is the body of information which contained a set of factors clustered in (9) nine subscales sets: (a) administration liability (8 items); (b) nursing autonomy (8 items); (c) participation in hospital affairs (4 items); (d) human resource management (7 items); (e) leadership commitment (9 items); (f) supportive education (6 items); (g) professional development (7 items); (h) collaborative relationship (9 items); and (i) quality of care (9 items). These factors was applied in a total of 63 items operationalized by a 4-point Likert scale with responses arranged from (1=strongly disagree to 4=strongly agree) wherein participants asked to select one of the statements within each question that most represents their point of view. The scoring system was guided by of the original tool. The measure is scored by assigning a value from 1 to 4 responses in each statement then total score for each respondent is arrived at by averaging the overall score. In addition to one open place for additional factors by participants.

Research procedures and tool development

Data collection started from June 2016 to September 2017. The beginning of the process of designing the tool was to review the current literature to find how the factors of the Infrastructure of Nursing Work Environment had been used in instruments related to this concept. Then, the process of development of the tool and assessing its validity and reliability was conducted throughout the following three phases;

First Phase:

The researchers of this study were concerned with the infrastructure reform of the nursing work environment throughout their professional field. Therefore, they interested to review the literature concerning studies that have concentrated on infrastructure measurement of nursing work environment. The researchers aimed to design a new Arabic version scale and set a group of multidimensional factors that clustered to nine subscales factors. This tool was derived from subsets of the original Revised Nursing Work Index (NWI-R) items and the other subsequent developed versions the Professional Environment Scale (PES-NWI) because the majority of its subscale factors was coincided when translated to Arabian wording with the culture of the Egyptian nurses who were belonging to various healthcare sectors.

A total of 73 items pool of the new constructed infrastructure scale were selected as best suitable statements that determined to be relevant when translated to Arabian language and make synergy with Arabic cultures and for findings the best scale that could investigate the infrastructure reform factors of the healthy nursing work environment in the Egyptian healthcare sectors which are major for the production of high quality nursing and patient care. Theses 73 items included 49 factors from NWI-R, which enclosed 31 factors from PES-NWI, and new 24 items were added to the new Egyptian version which has frequently communicated by nursing teams. The total items were distributed over 9 subscales.

Second Phase:

Face and Content Validity

To assess face and content validity of the new constructed scale (INWE), a draft of the questionnaire was administered to a panel of judges formed and constituted of 15 experienced nurses and managers from each hospital representing a different healthcare sector in Egypt, in addition to 9 professors from the Egyptian nursing faculties affiliated to the ministry of higher education, some modification was applied to the items in regards to their extent of coverage and their relevance to its specified objectives. A total of 65 items remained in the final draft of the questionnairethat were more liable to be interpreted in a comprehensive manner due to the exposure to nurses' rights atrocities and high work demands, while eight items were excluded from the 24 items that was added by the researchers. These items included the items number 3, 4, 7, 8, 16, 21, 26, 36, 39, 41, 46, 47, 50, 58, 63, and 64 in the final draft which translated to Arabic language then the translated tool was treated as a new instrument.

Pilot Study

To test the final draft of the Egyptian version instrument for meanings clarity and to estimate time consumed for each questionnaire sheet, the INWE scale was piloted by 15 subjects to ensure full understanding of the statements and ascertain whether item referents are at the desired level of all nurses.

Third Phase:

Construct Validity

Exploratory Factor Analysis (EFA) using the Principal Component Analysis (PCA) method with Varimax Rotation was used to verify construct validity. Scree plot with Eigenvalue greater than one were used for displaying the final number of factors in the newly developed instrument. Kaiser-Meyer-Olkin (KMO) and Barlett's test of Sphericity were analyzed to validate the adequacy of the sample with significance statistical difference.

Reliability Analysis Statistics

Reliability analysis was done by using the internal consistency test of Cronbach's alpha for all computed variables and the subscale factors sets, in addition, Intraclass Correlation Coefficient of two-way random model (where people effect and measures effects are random), and the consistency of the raters was assessed at confidence interval 95%. The Inter-items Correlation Coefficient was also computed for the subscale sets.

Ethical considerations

Before data collection, an official permission clarifying the purpose of the study was obtained from the executive directors of the hospitals to conduct the study and collect the necessary data. Ethical consideration and legal consent of participants obtained to participate in the study, also participants were informed about the privacy of the information, nature of the study, the purposes and procedures of the study. They were informed about their rights to refuse to participate or withdraw from the study at any time. Moreover, the participants were reassured that their responses would be kept confidential and their identities would not be revealed on research tools or reports.

Study Limitations:

The time consumed in tool construction was really boring due to the presence of too many scales which take longer time for translations and reviewing the most comprehensive wordings matching the Egyptian culture with essential meanings expressive organizational and work factors associated with better work environment for nursing practice. Pilot study was repeated for three times. Utilization of the newly developed scale was long in length which led to longer time in data collection.

Data Statistical Analysis

Excel Program and IBM Statistical Package for Social Sciences (SPSS) version 20.0 were used for data entry and statistical analysis. Statistical significance was considered at p-value <0.05.

III. Results and Data analysis

Table 1: Socio-demographic characteristics of the study sample (n=220)

Item	No.	%
Gender:		
Male	33	15.0
Female	187	85.0
Age:		
< 25 years	67	30.5
25 – 35	85	38.6
36 – 45	38	17.3
46 – 55	21	9.5
> 55 years	9	4.1
Qualifications:		
Less than bachelor degree	139	63.2
Bachelor degree	77	35.0
Master	3	1.4
Ph.D.	1	0.5
Job position:		
Director of nursing	3	1.4
Assistant director of nursing	4	1.8
Nurse supervisor	10	4.5
Head nurse	22	10.0
Staff nurse	181	82.3
Work experience:		
< 5 years	75	34.1
5 – 10	54	24.5
11 – 20	67	30.5
> 20 years	24	10.9
Social status:		
Single	76	34.5
Married	133	60.5
Divorced	8	3.6
Widow	3	1.4
Residency:		
Near to work place	99	45.0
Far from work place	121	55.0
Type of healthcare sector:		
Ministry of Health Hospital	58	26.4
Health Insurance Hospital	41	18.6
Curative Care Hospital	33	15.0
Teaching Hospital	32	14.5
Private hospitals	56	25.5

Table (1) displayed the distribution of the demographic data, the highest percentages of the study samples were respectively, constituted from females, age population between 25 and 35, qualification of nursing less than bachelor degree, nurses in a staff position and those who have less than 5 years of experience, married, residency far from the work place. The percent of nurses who were working in the ministry of health was little bite higher than in the private hospitals.

Table 2: Infrastructure of Nursing Work Environment 63 items with factor loadings (PrincipalComponent Analysis with Varimax rotation, Cronbach's Alpha 0.979, *n*=220).

Factors	All variables	Component Loadings
1. Administration Liability (Cronbach's α.880).	1. Hospital administration supports and values nurses	.526
	2. A chief nursing officer equal in power and authority to other top-level hospital executives	.554
	3. Adopt policies and practices that promote a non-punitive culture	.535
	4. Encourage open discussion and feedback on diagnostic performance	.648
	5. A work environment that is pleasant, attractive, and comfortable	.640
	6. Administration that listens and responds to employee concerns	.772
	7. Child care facilities for employees' children in the hospital	
	8. Link between executive administration and nursing training management	.468

2. Nursing Autonomy (Cronbach's α .850).	9. Nursing controls its own practice	.746
	10. Freedom to make important patient care and work decisions.	.734
	11. Adequate support services allow nurses to spend time with patients	.596
	12. Each patient care unit determines its own policies and procedures	.671
	13. Staff nurses actively participate in developing their own work schedules (i.e., what days they work; day off, etc.).	.674
	14. Staff nurses generally do not have to float from their designated unit	.539
	15. Not being placed in a position of having to do things that are against my nursing judgment	.733
	16. Freedom of nursing staff to select their uniform fashion	.681
3. Participating in Hospital Affairs (Cronbach's α.751).	17. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy	.745
	18. Nurses actively participate in efforts to control costs	.641
	19. The nursing staff participates in selecting new equipment	.520
	20. Opportunity for staff nurses to participate in policy decisions	.684
4. Human Resource Management (Cronbach's α .845).	21. Opportunities for grievance	.677
	22. Flexible or modified work schedules are available	.686
	23. Nursing staff are supported in pursuing degrees in nursing	.580
	24. Enough staff to get the work done	.588
	25. Praise and recognition for a job well done	.748
	26. Good selection for expert trainers for nurses	.774
	27. A satisfactory salary	
5. Leadership Commitment (Cronbach's α .799).	28. A chief nursing officer who is highly visible and accessible to staff	.781
	29. A supervisory staff that is supportive of nurses	.743
	30. Supervisors use mistakes as learning opportunities not criticism	.696
	31. Enough time and opportunity to discuss patient care problems with other nurses	.754
	32. A nurse manager who is a good manager and leader	.707
	33. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician	.742
	34. Nurse Managers consult with staff on daily problems and procedures	.739
	35. The opportunity for staff nurses to consult with clinical nurse specialists or expert nurse clinicians	.727
	36. Facilitate more effective teamwork	.734
6. Supportive Education (Cronbach's α .868).	37. A good orientation program for newly employed nurses	.750
	38. A preceptor program for newly hired nurses	.724
	39. Educators and leaders ensure that curricula and training programs across the career trajectory	.722
	40. Active staff development or continuing education programs for nurses	.781
	41. Nurses' pursuing education is valued in organization	.580
	42. Working with experienced nurses who 'know' the hospital system	.766
7. Professional Development (Cronbach's α .886).	43. Career development/clinical ladder opportunity	.634
	44. Opportunity to work on a highly specialized patient care unit	.736
	45. Nursing care is based on a nursing rather than a medical model	.671
	46. Opportunities to read and search during working hours	.686
	47. Opportunities to write and publish	.671
	48. Opportunities for advancement	.663
8. Collaborative Relationship (Cronbach's α .927).	49. Physicians recognize nurses' contributions to patient care	.773
	50. Physicians support new nurses	.752
	51. A lot of team work between nurses and physicians	.757
	52. Physicians respect nurses as professionals	.657
	53. Collaboration (joint practice) between nurses and physicians	.687
	54. Good working relationships with other hospital departments	.735
	55. Physicians value nursing observations and judgments	.798
9. Quality of Care (Cronbach's α .901).	56. Support for new and innovative ideas about patient care	.738
	57. Enough registered nurses on staff to provide quality patient care	.714
	58. Healthcare professionals safety	.713
	59. Physicians give high quality medical care	.749
	60. Written, up-to-date nursing care plans for all patients	.818
	61. Patient care assignments that foster continuity of care, that is, the same nurse cares for the patient from one day to the next	.601
	62. Working with nurses who are clinically competent	.760
	63. Design the work system in which the diagnostic processes facilitate accurate and timely diagnoses	.616
	64. Health information technologies support patients and healthcare professionals in the diagnostic process	.758
	65. Existence of an active quality assurance program	.612

Table (2) illustrated the loading factors of the total 63 items of the new scale by using principal component analysis with Varimax rotation and Kaiser Normalization, the Cronbach's Alpha for total items was

0.97.The analysis of the rotated components loading revealed 63 items loaded greater than (>0.40) of the cutoff point, items number 7 and 27 were dropped. Out 63 of total items, 30 items loaded between 0.40 and 0.70 while the others 33 items show loading greater than 0.70.

Table 3: Means, Standard Deviation, components loading, and Intraclass correlation coefficient.Cronbach's Alpha for 9 components = 0.949

Component Factors	N of Items	Mean± Std. Deviation	Cronbach's Alpha	ICC	Component Loadings
1. Administration Liability	7	20. 84 ± 4.12	.835	.880	.807
2. Nursing Autonomy	8	24.57 ± 4.41	.850	.850	.933
3. Participating in Hospital Affairs	4	12.04 ± 2.33	.751	.751	.938
4. Human Resource Management	6	19.27 ± 3.38	.806	.845	.892
5. Leadership Commitment	9	29.21 ± 5.75	.799	.799	.927
6. Supportive Education	6	19.13 ± 3.87	.868	.868	.920
7. Professional Development	6	17.76 ± 4.52	.886	.886	.880
8. Collaborative Relationship	7	22.76 ± 4.47	.927	.927	.874
9. Quality of Care	10	32.02 ± 5.89	.901	.901	.952

Table (3) revealed average measures of Intraclass Correlation Coefficient using consistency type and two-way mixed model, thenumber of items listed under each component and the Cronbach's Alpha for the 9 components was 0.94**.** The highest scores of component loading were for Quality of Care .922, Nursing Autonomy .920 and Leadership Commitment .902 respectively.

Table 4: Correlation Coefficients between Nine Components (n=220).

Inter-Item Correlation Matrix									
Total Factors	1	2	3	4	5	6	7	8	9
1. Administration Liability	1.000								
2. Nursing Autonomy	.764	1.000							
3. Participation in Hosp. Affairs	.689	.845	1.000						
4. Human Resource Manage.	.615	.821	.724	1.000					
5. Leadership Commitment	.638	.766	.687	.699	1.000				
6. Supportive Education	.594	.771	.694	.778	.766	1.000			
7. Professional Development	.551	.736	.690	.665	.706	.885	1.000		
8. Collaborative Relationship	.612	.724	.544	.665	.681	.620	.514	1.000	
9. Quality of Care	.676	.824	.682	.771	.808	.803	.773	.831	1.000

Table (4) displayed the inter-item correlation matrix of the comprised subscale sets which ranged from 0.514 to 0.885 with statistical significant difference of moderate to strong positive correlation among all dimensions. The highest correlations were 0.885 for "supportive education" and "Professional development", also 0.845 for "nursing autonomy" and "participation in hospital affairs", as well as 0.831 for "collaborative relationship" and "quality of care" respectively.

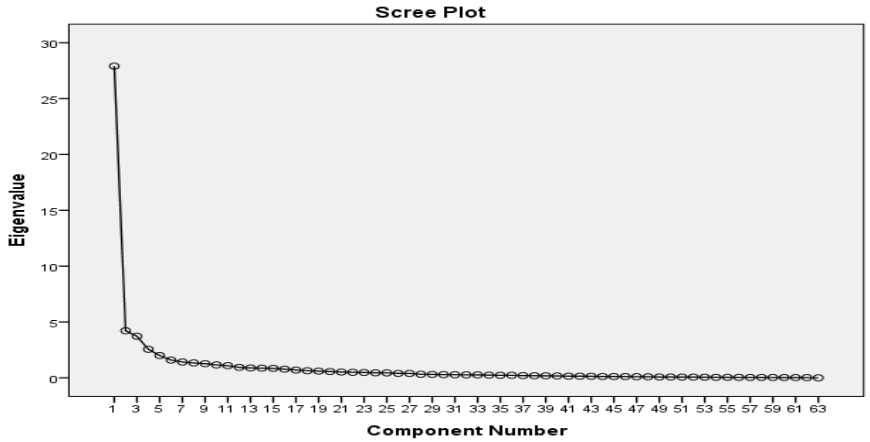

Figure (1) displayed the score plot with Eigenvalues above one and loading value equal to or above 0.4 where 11 factors were extracted through exploratory factor analysis.

IV. Discussion

The determination of relevant PES-NWI items across different practice settings and contexts were recommended for future research by utilizing a standardized scoring strategy to guarantee consistency and simplify comparisons across several studies. Therefore, this study was driven from this recommendation and aimed to assess the reform factors of infrastructure of nursing work environment in Egypt through the reapplication of NWI-R with tool modification by the researchers to be synchronized with our developing country.

The newly constructed tool comprised of 63 items with new nine subscale dimensions created based on the literature review for the concepts of traditional models and recent models of management theories because of the critical role of the hospital administration and human resource management as a prime responsible for inducing healthy work environment on staff performance and identity in any healthcare settings. In this regard, ***Loiseau, J. W. (2011)*** had reported that unacceptable working conditions result in lack of staff satisfaction. From the same envision, Nurses managers and leaders are critical element of any health organizations for the well-done of nursing carriers. A positive correlation between leadership or supervision and work motivation had depicted from a study conducted by ***Reena Ali & M Shakil Ahmed (2009).***

The nine subscale dimensions revealed loading level ranged from 0.807 for administration liability to 0.952 for quality of care. The components loadings for the remaining components was respectively, 0.874 collaborative relationship, 0.880 professional development, 0.892 human resource management, 0.920 supportive education, 0.927 leadership commitment, 0.933 nursing autonomy, 0.938 participating in hospital affairs. High reliability of Cronbach's alpha ranged from 0.751 to 0.927 was confirmed. The total Cronbach's alpha for the nine components was 0.949, and for all 63 variables was 0.979 with total variance explained 74.576%. This means that there were strong relations between all dimensions of the constructed tool which support the aim of this study.

Nursing autonomy, leadership commitment and participation in hospital affairs were confirmed as important in the infrastructure of the nursing work environment. The findings were consistent with the two factors theory of motivation for Herzberg (1974), it was reported that job enrichment give the chance for employees' psychological growth. The theory also recommends that work should be enriched for best effective utilization of personnel as employees give more attention for their concern. Content factors, such as recognition, achievement, responsibility and advancement, are likely to be more crucial in motivating employee as a valid work environment based on today's concept of administration that was confirmed from several studies implemented in both developed and developing countries.

The findings confirmed that two items were less than the cutoff point where the researcher elevate it to 0.4 to lesser the length of the new scale, from the researcher previous experience as a nurse manager past two decades, found that the majority of nurses were either make absent or dismissed from the work because of the unavailability of child facility or nursery and there were too much complaints of under estimated salaries and benefits, therefore, the researcher aimed to add this two items to the new scale. The findings from this study revealed that these two items had least loading value (lesser than the cutoff point). This finding was concurrent with ***Kramer & Schmalenberg (2002)*** who reported that some items of the IWN were no longer relevant to job satisfaction. The same thing with ***London A., (2009),*** the study articulated that salary or compensation does not play as an initial factor for employee's motivation.

A methodological study design was implemented on (220) nurses working in different managerial and qualification levels. Intraclass correlation coefficient between rater for the average measure of data ranged from .751 and .927 which represent a strong reliability level, in which "Collaborative Relationship" had highest Intraclass correlation coefficient "0.927" and "Quality of Care" had highest Component Loadings 0.952. The results of the study concluded that, all the 63 items and its 9 subscales are reliable and construct valid for use as a tool for measuring the factors that bear on the infrastructure reform of the nursing work environment.

V. Conclusion

Measuring Infrastructure of nursing work environment scalewas designed and validated and its content validity was demonstrated, concurrent validity was acceptable with high level of reliability.

VI. Recommendations

- Infrastructure of Nursing Work Environment (INWE) can help policy-makers of healthcare sectors to administer adequate interventions to improve patients and nurses outcomes.

- The new Arabic scale offers the possibility to acquire insight about the major differences and nuances in nursing work environment of the healthcare sectors.
- Application of the tool in a diversity of similar settings would offer data that can help in improving its psychometric characteristics and to implement reform programs to all healthcare sectors.
- Improving the produced tool through enrolling other alternative representative of participants form both experts and juries.
- Further revisions of this Egyptian version of the new constructed scale are required to increasethe relevance of the measure to the Arabic setting being used.

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