

Assessing the knowledge, attitude and factors affecting team building activities amongst health workers in Nigeria using the permutation method for Hotelling t-squared analysis

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Abstract: This study is on assessing the knowledge, attitude and factors affecting team building activities amongst health workers in Nigeria. The objective of this study is to determine the equality on knowledge and attitude of team building activities between health workers of Anambra state and Delta State. The source of data for this study was questionnaire, administered randomly to a sample of 200 workers at Anambra State and a sample of 305 workers at the Delta State. The test statistic used was the permutation method for Hotelling T-squared. The result of the analysis showed that there exist a significant difference on knowledge, attitude and factors affecting team building in Anambra State and Delta State with a test statistic value of 8073.7 and a p-value of 0.00 for 10, 000 permutations. This result indicate that the obtained significant value of 0.00 fall on the rejection region of the hypothesis assuming a significance level of 5% ($\alpha = 0.05$) and implies that there is significant difference on the knowledge, attitude and factors affecting team building in the two States. Suggestion for the management of health in Anambra State to encourage the practice of team building by either sponsoring training of staff on team building or organizing seminars that will enhance the practice of team building was made since as argued in the present study that the benefit of team building in any organization is to achieves cohesiveness, improve the team attitude, effectiveness and enhances productivity. Studies on assessing the knowledge, attitude and factors affecting team building in other professional sector such as education, finance and environment in Nigeria is seen as an area for future research.

Keywords: Cohesiveness, Significant, Management, Administered, Seminars

1. Introduction

Team building is the process of helping a workgroup become more efficient in accomplishing its tasks and in satisfying the needs of group members. Team building is an intervention conducted in a work unit as an action to deal with a condition(s) seen as needing improvements. [1], defined team building as a process by which members of a group diagnose how they work together and plan changes which improve their effectiveness. Team building represents a varied concept for different professional groups with a common agreement that team building is a process aimed at improving the performance of a group. Team processes describe subtle aspects of interaction and patterns of

organizing that transforms input into output. Team processes can be described in terms of seven characteristics; coordination, communication, cohesion, decision making, conflict management, social relationships and performance feedback [2]. Teams require the right number of members with the appropriate mix and diversity of task and interpersonal skills. A balance between homogeneity and heterogeneity of members' skills, interests and backgrounds is preferred [3]. Team building is a new concept used in business circles and amongst business executives to stimulate work teams. Its objective is to build team spirit, team synergy or to consolidate teams. Developed at the beginning of the 1980's in the United States, team building has become the most popular group and leadership training approach in both Europe and North America. The majority

of middle and large businesses use this type of activity at one time or another [4]. Homogenous teams are composed of similar individuals who complete tasks efficiently with minimal conflict. In contrast, heterogenous teams incorporate membership diversity and therefore facilitate innovation and problem solving. Healthcare teams are often large, due to norms of professional representation, regardless of contribution to patient care. In the healthcare sector, human resources for health have been defined by the World Health Organization (WHO) as those who promote and preserve health as well as those who diagnose and treat diseases. Also included are health management and support workers who help to make the health system functional but do not provide health services directly. This definition include the medical doctors, nurses, nutritionists, psychologists, social health workers, health record keepers, administrators and the security personnel, among others. [5], defined a team as a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as intact social entity embedded in one or larger social system and who manage their relationships across organization borders. Health professionals perception as to whether or not they belong to a team varies, in some cases these professionals see themselves as working in uni-professional teams (for example a nursing team) while others see themselves as inter-professional team working in institutionally based teams such as a stroke team comprised of a range of professionals. In their own contribution, [6], defined a team as a group that has a job to do, whether as paid participants or as volunteers. They added that it is a group that has spent some time together, whether in smaller increments over a long period of time, or by spending a weekend or more working together on something. It is a group that achieves cohesiveness; a team's strength is found in the relationships among the team members. It is a group with a common objective, whose members are very clear about working toward one purpose. It is a group whose members are interdependent. Whereas other groups may recognize the strengths of each member, team members rely on the strengths of each member to accomplish the objective. According to [7], team processes describe subtle aspects of interaction and patterns of organizing that transforms input into output in an establishment. This includes communication, co-ordination, cohesion, decision-making, conflict management, social relationships and performance feedback. [8], reported that in the healthcare sector there are different types of teams these includes labor and delivery units, primary health care teams, intensive care units, teams assembled for a specific task such as an emergency response team or inter-professional teams such as multidisciplinary cancer care team. [5], explained that the aim of team building is to achieve teamwork and not necessarily collaboration because not all collaboration gives rise to inter-professional teamwork. They added that teamwork is the interaction or relationship of two or more health professionals who work interdependently to provide care for

patients. Teamwork means members of the team are mutually dependent, see one another as working collaboratively to provide patient care, share information which may lead to shared-decision making and know when teamwork should be used to optimize patient-centered care. Speaking on the impact of inter-professional teambuilding, [9], noted that attitudes of undergraduate's health profession post-course evaluation after 4 years showed that 61% of the participants rated the course to be very beneficial. They also added that ratings of contacts among participants was high immediately after training and declined over the four years period. [10], in their contribution on knowledge and attitudes towards the healthcare team reported that their exist a significant differences in knowledge areas with increase in awareness of community agencies that provide healthcare services, increase in awareness of the skills and strengths of other healthcare team members and increase in the amount of experience working with other healthcare professionals. [11], using qualitative analysis observed that majority of the primary care organizations in England and Wales identified the need to develop a strategic approach of inter-professional teamwork, to meet educational needs of primary care professionals, for fruitful alignment of objectives to be rewarding for participants. [2], noted that the ability to trust originates from self-knowledge and competence. Trust must be slowly built up across team members who have different competencies, assumptions and priorities, through developing confidence in each other's competence and reliability. Trusting individuals are willing to share their knowledge and skills without fear of being diminished or exploited. They added that self-knowledge and an ability to trust others are the building blocks of commitment. Commitment to a unified set of team goals and values provides direction and motivation for individual members. Healthcare teams generate commitment through a shared goal of comprehensive patient care and a common belief that the team is the best way to deliver this coordinated care. Committed individuals are more willing to invest personally in the team, contribute to the decision making and respect the balance of interdependence and collaboration.

[12], explained that the problem of poor inter-professional collaboration is seriously threatening the expected outcomes of team building in the healthcare sector as corroborated by a survey of doctors and nurses working in four university teaching hospitals in Southern Nigeria with results that nurse-doctor working relationships were significantly statistically affected by poor social interaction, staff shortages, activist unionism, disregard for ones profession and hospital management and government policies. They added that team building training is the set of tools and methods that form an instructional strategy, which provide team members with the opportunities to practice skills and receive feedback in a rich learning environment. The strategy is dependent on many variables, such as the knowledge, skills and attitudes (KSAs) that need to be trained and the resources available. Regardless of the

strategy, team building focuses on the development of a robust instructional method for influencing team processes (such as communication, collaboration and coordination) and outcomes. Team building comes to life when available tools (for example, team task analysis, performance measurement or task simulation and exercises), delivery methods (for example information, demonstration or practice-based) and content (for example KSAs) are combined. Process intervention activities are designed to assist individuals and groups to examine, diagnose, and act upon their behavior and interpersonal relationships. The ideal end results of these activities are improved team attitudes and effectiveness. Team building consists of four components; goal setting, interpersonal relationships, role clarifications and problem-solving [7]. The need for team building among health disciplines is crucial to patient care, team morale and administrative efficiency has been supported in numerous Medicine, Nursing and public health journals ([13], [5]).

[14], stressed by obliging to cooperate with colleagues in sharing responsibilities and tasks, team work creates numerous obligations including having to accept others, to adapt to their way of being and working, on top of having to take into account tactless or disorganized personalities with whom they must deal, which requires a good deal of acceptance. A team in which the team members are constantly changing cannot develop a feeling of belonging, the members cannot get to know each other, to appreciate each other or to permeate themselves with a common aim. It is the responsibility of management to try to assure the presence of the same people in a team as often as possible. Also, teamwork is impossible without collaboration and collaboration is impossible without the respect of others and their competencies whatever their level of training. [15], explained that in nursing profession, there is difficulty in working together as a team with some of the team members from different levels of training. Moreover, the complexity of certain care procedures distributed amongst several workers belonging to different professional groups makes it difficult to clearly apportion the tasks. However, this type of work organization does not just have negative aspects, on the contrary, but in order to improve team functioning, it is important to be realistic and to also look at the more difficult elements. Equally, Teamwork in a hospital setting has existed for a long time and has demonstrated its superiority over individual work. By the division of labor and shared responsibilities among several persons, each member has a particular role and each role, according to its level of responsibility, is important. No member of the team is superfluous and no role is negligible. For there to be real team spirit, participants must not only share a common goal but their efforts must converge. This gives coherence to their work. The final result is somewhat akin to players in a sports club each of whom bears responsibility for the successes or failures of the team. The division of tasks according to the competencies and capacities of each one guarantees the efficiency of the work and the respect of each member's

potential.

[16] in their study noted that the factors that affect team effectiveness are combining educational responsibilities (for resident health professionals) and clinical obligations to patient care; purpose, motivation and team goals; team membership, understanding of members roles; adjustment and problem solving as a team; team process; communication; recognition; support from fellow members; overcoming barriers to effective teamwork (which include absenteeism, disorganized teams, too little time for team building and unwillingness to accommodate a fellow member); organizational factors (governance); team meetings.

This study aims to determine the equality on knowledge and attitude of team building activities between health workers of Anambra state and Delta State. Also to address the need for training of healthcare workers on team building among healthcare workers for quality healthcare to enhance inter-professional team building for effective teamwork in order to contribute in developing formal inter-professional education programme for healthcare workers in Nigeria.

2. Material and Methodology

2.1. Data Collection

The source of data for this study was generated using questionnaire administered randomly to a sample of 200 workers at Nnamdi Azikiwe University Teaching Hospital, Nnewi-Anambra State and Anambra State Teaching Hospital which represents health workers at Anambra State. Also, responses from a sample of 305 workers was obtained from workers at Federal Medical Centre, Asaba-Delta State and Delta State Teaching Hospital, Oghara-Delta State was used to represent health workers of Delta State. The samples includes workers from departments such as Community Medicine, Internal Medicine, Obstetrics and Gynecology, Surgery, Pediatrics, General Medical practice, Nursing, Pharmacy, Institute of Human Virology of Nigeria, Medical Laboratory, Nutrition and Dietetics, and Administration of the two health facilities.

2.2. Permutation Method for Hotelling's T^2

The permutation test is a conditional test since it generates the permutation distribution conditional on the observed values of the random variables (unlike the randomization model where the observed values were not random except their treatment assignments). The test is also conditionally distribution-free, since, conditional on the observed data, the permutation distribution of the test statistic does not depend on the population distributions ([17], [18], [19], [20], [21], [22]). Also, the permutation test is conditionally exact for the same reasons that the randomization test is exact, but it is also unconditionally exact since the probability of a Type I error is controlled for all possible samples [18]. The permutation method for Hotellings T^2 measures whether

the mean vectors of the two groups differ significantly. One measures of the difference in mean vector is the two-sample Hotellings T^2 statistic which is given as

$$T^2 = \frac{n_1 n_2}{n_1 + n_2} (\bar{X} - \bar{Y}) S^{-1} (\bar{X} - \bar{Y}) \quad (1)$$

The pooled estimate of the variance-covariance matrix S is given as

$$S = \frac{A+B}{n_1 + n_2 - 2} \quad (2)$$

Where, \bar{X} and \bar{Y} are the mean vector of the two samples, A and B are the covariance matrix of the two samples.

2.3. The Testing Procedure of the Permutation Method for Hotellings T^2

- 1 Consider two independent random samples $\{X_i, i=1, 2, \dots, n_1\}$ and $\{Y_i, i=1, 2, \dots, n_2\}$. To test the hypothesis that both samples came from the sample distribution we shall obtain the mean vector of the two samples \bar{X} and \bar{Y} .
- 2 We obtain the reference value of the test statistic, T^2 using Equation (1) and Equation (2)
- 3 Permute at random the rows and corresponding columns of the covariance matrix of one of the samples; A .
- 4 Compute the test statistic T_i^{2*} , obtaining a value T^{2*} of the test statistic under permutation.
- 5 Repeat steps 2 and 3 a large number of times to obtain the distribution of T^{2*} under permutation; add the reference value T^2 to the distribution.
- 6 For a one-tailed test involving the upper tail, calculating the probability (p value) as the proportion of values T^{2*} greater than or equal to T^2 . Conversely, for a test in the lower tail, the probability is the proportion of values T^{2*} less than or equal to T^2 .

2.4. Data Presentation (See Appendix for Table 1 and Table 2)

3. Analysis and Result

Research Hypothesis is stated as

H_{01} : There is no significant difference on the knowledge, attitude and factors affecting team building amongst health workers in Anambra and Delta State

H_{11} : There is significant difference on the knowledge, attitude and factors affecting team building amongst health workers in Anambra and Delta State

Inputting the data in Table 1 and Table 2 on R 2.13.0 command window; [23], where Agree, Undecided, Disagree,

and Not applicable are objects of matrix Anambra; these are responses obtained from Anambra State workers (see Table 1) while Agree, Undecided, Disagree, and Not applicable are objects of matrix Delta; these are responses obtained from workers of Delta State (see Table 2).

```
R>Anambra=matrix(c(30, 120, 0, 50, 25, 150, 0, 25, 31, 119, 0, 50, 20, 130, 0, 50, 127, 43, 0, 30, 120, 50, 0, 30, 27, 148, 0, 25, 26, 149, 0, 25, 30, 145, 0, 25), nrow=9, byrow=TRUE, dimnames = list(1:9, c("Agree", "Undecided", "Disagree", "Not applicable")))
```

```
R>Delta=matrix(c(280, 20, 0, 5, 291, 9, 2, 3, 250, 50, 1, 4, 275, 30, 0, 5, 292, 8, 0, 5, 294, 6, 1, 4, 256, 44, 0, 5, 250, 50, 0, 5, 261, 39, 2, 3), nrow=9, byrow=TRUE, dimnames = list(1:9, c("Agree", "Undecided", "Disagree", "Not applicable")))
```

```
R> Test=hotelling.test(Anambra, Delta, shrinkage = FALSE, perm = TRUE, B= 10000)
```

Test stat: 8073.7

Numerator df: 4

Denominator df: 13

Permutation P-value: 0

Number of permutations: 10000

4. Discussion

From the result obtained, it was observed that there exist a significant difference on knowledge, attitude and factors affecting team building in Anambra State and Delta State with a test statistic value of 8073.7 and a p-value of 0.00 for 10, 000 permutations as was presented by the hotellings.test function. This result indicates that the obtained significant value of 0.00 fall on the rejection region of the hypothesis assuming a significance level of 5% ($\alpha = 0.05$) and implies that there is significant difference on the knowledge, attitude and factors affecting team building in the two health facilities. Hence, the null hypothesis was rejected since p-value = 0.00 is less than $\alpha=0.05$ assuming a 95% confidence interval level.

5. Conclusions

This study assessed the equality on knowledge, attitude and factors affecting team building activities between health workers of Anambra state and Delta State. From the finding, it was observed that the knowledge, attitude and factors affecting team building between workers of Anambra State and Delta State is significantly different. This result implies that workers at Anambra State has less knowledge and attitude of team building activities unlike the workers of Delta state who has been implementing the approach of team building. we suggest that the management of health in Anambra State should encourage the practice of team building by either sponsoring training of staff on team building or organizing seminars that will enhance the practice of team building since as argued by [7, 10, 15] and the present study the benefit of team building in any

organization is to achieve cohesiveness, improve the team attitude, effectiveness and enhances productivity. Also, we encourage management of health in Nigeria to try to assure the presence of the same people in a team as often as possible because a team in which the team members are constantly changing cannot develop a feeling of belonging,

the members cannot get to know each other, to appreciate each other or to permeate themselves with a common aim [14]. Studies on assessing the knowledge, attitude and factors affecting team building in other professional sector such as education, finance and environment in Nigeria is seen as an area for future research.

Appendix

Table 1. Distribution of Responses on knowledge, attitude and Factors affecting Team Building from Workers in Anambra State

| S/No. | Question | Agree | Undecided | Disagree | Not Applicable |
|-------|---|-------|-----------|----------|----------------|
| 1 | Team building could be defined as the process of helping a work group becomes more efficient in accomplishing its tasks and in satisfying the needs of the group members | 30 | 120 | 0 | 50 |
| 2 | Inter-professional team building means purposeful activities bringing members of different professionals / departments together as a team | 25 | 150 | 0 | 25 |
| 3 | The following Case /care management, Clinical knowledge, Management knowledge Organizational goals and strategies, Organizational politics, Roles of team members, Self-awareness, Team development, Understanding of individual persons, are the knowledge competencies that a member of inter-professional healthcare team should possess to be effective | 31 | 119 | 0 | 50 |
| 4 | Will team building events and activities result in benefits to your department/ organization | 20 | 130 | 0 | 50 |
| 5 | Will you participate in an inter-professional team building activities/ training if you have an opportunity | 127 | 43 | 0 | 30 |
| 6 | Will you recommend inter-professional team building activities/ training to your department's professionals to improve working/ interpersonal relationships with professionals of other departments | 120 | 50 | 0 | 30 |
| 7 | The factors that affect team building are: Practice level factors which may be individual professional factors, Organizational level factors like style of management and Systemic factors like policy of government | 27 | 148 | 0 | 25 |
| 8 | The factors that make a team effective are Team structure /size , Recognition, Managing the team ,Ability to perform ,Accountability ,Temperament, Managing stress, Creating the environment ,Defined Common purpose, Measureable goals Goals/Objectives, Effective Leadership, Good Cohesion/ commitment to team , Mutual respect and Effective communication. | 26 | 149 | 0 | 25 |
| 9 | Factors that act as barriers to effective team work are: Larger team size, Difficulty in combining responsibility for residents in-training professionals and clinical obligations to patient-care, Absenteeism from meetings, Disorganized teams, Too little time for team building ,Unwillingness to accommodate fellow member, Policy of government, and Organizational management style like fund-holding practice. | 30 | 145 | 0 | 25 |

Table 2. Distribution of Responses on knowledge, attitude and Factors affecting Team Building from Workers in Delta State

| S/No. | Question | Agree | Undecided | Disagree | Not Applicable |
|-------|---|-------|-----------|----------|----------------|
| 1 | Team building could be defined as the process of helping a work group becomes more efficient in accomplishing its tasks and in satisfying the needs of the group members | 280 | 20 | 0 | 5 |
| 2 | Inter-professional team building means purposeful activities bringing members of different professionals / departments together as a team | 291 | 9 | 2 | 3 |
| 3 | The following Case /care management, Clinical knowledge, Management knowledge Organizational goals and strategies, Organizational politics, Roles of team members, Self-awareness, Team development, Understanding of individual persons, are the knowledge competencies that a member of inter-professional healthcare team should possess to be effective | 250 | 50 | 1 | 4 |
| 4 | Will team building events and activities result in benefits to your department/ organization | 275 | 30 | 0 | 5 |

| S/No. | Question | Agree | Undecided | Disagree | Not Applicable |
|-------|---|-------|-----------|----------|----------------|
| 5 | Will you participate in an inter-professional team building activities/ training if you have an opportunity | 292 | 8 | 0 | 5 |
| 6 | Will you recommend inter-professional team building activities/ training to your department's professionals to improve working/ interpersonal relationships with professionals of other departments | 294 | 6 | 1 | 4 |
| 7 | The factors that affect team building are: Practice level factors which may be individual professional factors, Organizational level factors like style of management and Systemic factors like policy of government | 256 | 44 | 0 | 5 |
| 8 | The factors that make a team effective are Team structure /size , Recognition, Managing the team ,Ability to perform ,Accountability ,Temperament, Managing stress, Creating the environment ,Defined Common purpose, Measureable goals Goals/Objectives, Effective Leadership, Good Cohesion/ commitment to team , Mutual respect and Effective communication. | 250 | 50 | 0 | 5 |
| 9 | Factors that act as barriers to effective team work are: Larger team size, Difficulty in combining responsibility for residents in-training professionals and clinical obligations to patient-care, Absenteeism from meetings, Disorganized teams, Too little time for team building ,Unwillingness to accommodate fellow member, Policy of government, and Organizational management style like fund-holding practice. | 261 | 39 | 2 | 3 |

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