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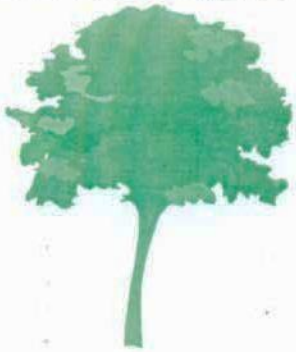

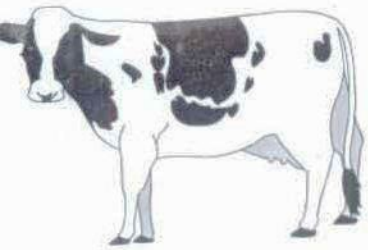

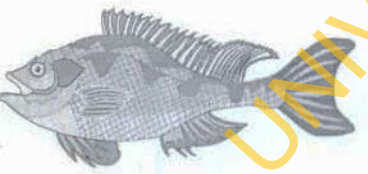

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JOURNAL OF ENVIRONMENTAL EXTENSION

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EVALUATION AND USERS' VIEW OF AMENITY TREES IN THE PREMISES OF SELECTED PUBLIC HOSPITALS IN IBADAN METROPOLIS

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ABSTRACT

The study enumerated and assessed tree species found in selected hospitals' premises in Ibadan for amenity planting. The study also examined the premises users' awareness of the benefits and probable threats posed by the trees as well as the premises users' willingness to support conservation of trees in the hospital premises.

Five public hospitals were purposively selected for the study. Trees in the selected premises were enumerated and their suitability as amenity trees was evaluated by identifying the desirable and undesirable attributes of the species. Data on availability of requisite institutional structures for sustainable management of the amenity trees were collected by administration of questionnaire on the officials of the units/ departments (works or maintenance) in the hospitals that are responsible for the management of the physical environment of the hospitals. Information on users' views of the trees was collected through administration of questionnaire on 40 randomly selected staff members in each of the selected hospitals. Thus a total of 200 questionnaires were administered in the five hospitals. Data collected were analyzed with descriptive statistics.

A total of 354 trees comprising 12 species were enumerated in the hospitals' premises. The identified species are *Delonix regia, Mangifera indica, Plumeria rubra, Polyalthia longifolia, Roystonea regia, Terminalia catappa, Pinus caribea, Elaeis guineensis, Tectona grandis, Dacryodes edulis, Gliricidia sepium, and Samanea saman*. Most of the identified species have more desirable traits for amenity planting than undesirable traits. Cooling the environment (25.67%), provision of shade (25.67%) and beautification (24.78%) of environment top the list of services derivable from the trees in the hospitals' premises. Furthermore, 76% of the respondents opined that trees do not constitute hazards, 58.5% observed that leaves and fruits of trees litter the premises regularly, 66.7% claimed that trees occasionally fall on the roads as a result of windstorms while 58% was willing to support planting and management of the trees in the hospital premises.

Since trees provide salient benefits to the users of hospital premises, hospital management should consider treescape as a basic and important infrastructure that should be incorporated into the physical planning of the hospitals. Forestry professionals however have to help hospitals' management boards to create a functional and conducive treescape necessary for the uplift of wellbeing of hospital premises users.

INTRODUCTION

The belief that plants and gardens are beneficial to patients in healthcare environments is more than one thousand years old, and appears prominently in Asian and western cultures (Ulrich and Parsons, 1992). During the middle ages in Europe, for example, monasteries created elaborate gardens to bring pleasant, soothing distraction to the ill (Gierlach-Spriggs et al., 1998). European and American hospitals in the 1800s commonly contained gardens and plants as prominent features (Nightingale, 1996). Due to the pure air and aesthetic services that trees provide, they accelerate the process of recuperation of patients from several ailments.

Ulrich, (1984), reported that access to views and usage of nature and green spaces have a beneficial impact on mental well-being and cognitive function and can also be psychologically and physiologically restorative, reducing blood pressure and stress levels. Hospitalised patients may recover faster if they can see trees (as opposed to buildings) from their window, while periods spent out of doors can have therapeutic value for patients and residents of hospitals and old people's homes.

Therefore, it has become a common practice to have trees planted in the premises of health institutions because of their therapeutic values to patients and the provision of a soothing and calm environment for the relief of stress on patient's relations and hospital workers.

However, the survival and effectiveness of the trees in providing these social and environmental services depend largely on: (i) the disposition of the public to the preservation of the trees which to a large extent is determined by their views of the services provided by the trees and (ii) the suitability of species for amenity planting, since trees in hospital premises can constitute hazards if right species are not planted and if the trees are not properly managed.

It is therefore necessary to identify tree species in the premises of public hospitals in Ibadan metropolis in order to evaluate the suitability of the tree species for amenity planting. It is also imperative to examine the views of the users of the premises so as to know whether the users of the premises are cognisant of the

services of the trees and are willing to contribute to the conservation of the amenity trees.

METHODOLOGY

Five hospitals were purposively selected for the study. These hospitals being the biggest and oldest in the metropolis have very big premises with trees to provide various services to the users of the premises. These hospitals are: University College Hospital (UCH), Ring Road State Hospital (RRSH), Adeoyo Teaching Maternity Hospital (ATMH), Jericho Nursing Home (JNH) and Oni Memorial Children Hospital (OMCH).The size and location of the hospital premises are presented in Table 1 and Figure 1 respectively. Information on users' views of the trees was collected through administration of questionnaire on 40 randomly selected staff members in each of the selected hospitals. Thus a total of 200 questionnaires were administered and retrieved from the respondents in the five hospitals.

Trees in the selected premises were enumerated in order to identify the species and also to determine their population. The suitability of the identified species for amenity purpose was evaluated by identifying the attributes of the species vis-à-vis desirable and undesirable traits of trees for amenity planting. Data on availability of requisite institutional structures (policy, legal, administrative and funding) for sustainable management of the amenity trees were collected by administration of questionnaire on the officials of the units/ departments (works or maintenance) in the hospitals that are responsible for the management of the physical environment of the hospitals. Data collected were analysed with descriptive statistics.

Table 1: Location and Extent (Km^2) of the Selected Hospital Premises

Name	Longitude	Latitude	Area (Km^2)
Adeoyo Teaching Maternity	3^0 54.12′ - 3^0 54.24′	7^0 23.16′ - 7^0 23.22′	0.02
Ring Road State Hospital	3^0 51.54′ - 3^0 51.8′	7^0 20.88′ - 7^0 21.24′	0.19
Jericho Nursing Home	3^0 52.08′ - 3^0 52.26′	7^0 23.88′ - 7^0 24.06′	0.08
Oni Memorial Children Hospital	3^0 51.72′ - 3^0 51.78′	7^0 21.72′ - 7^0 21.78′	0.01
University College Hospital	3^0 53.82′ - 3^0 54.60′	7^0 23.94′ - 7^0 24.42′	0.82

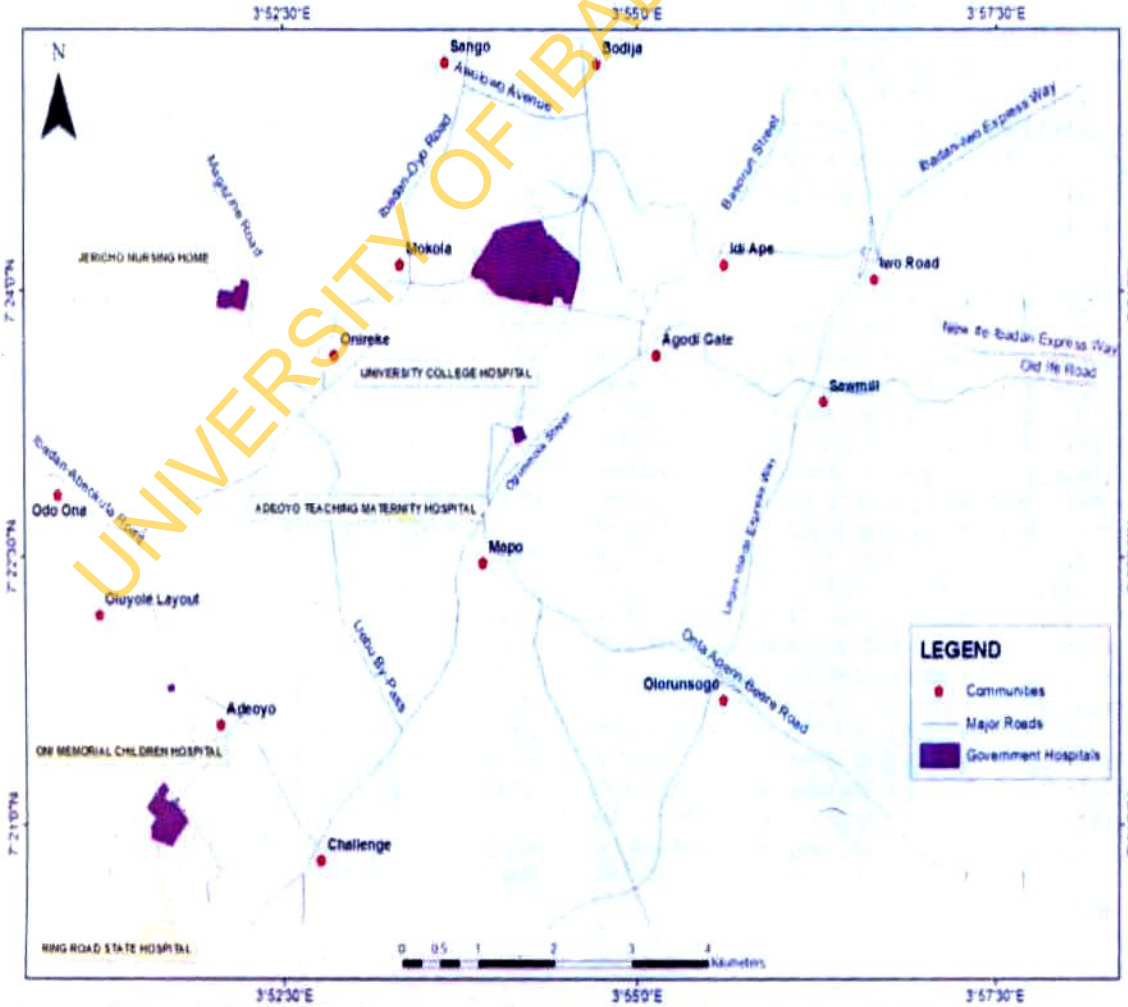

Figure 1: Map of Ibadan Metropolis showing the Selected Hospital Premises

RESULTS AND DISCUSSION

Survey of Trees in the Selected Hospital Premises in Ibadan Metropolis

Results in Table 2 show that the premises of the five selected public hospitals contained 354 trees and 12 species. Out of this tree population, *Deloni xregia* which is the most prominent species accounted for 18.36%, *Mangifera indica* accounted for 14.69% while *Terminalia catappa* accounted for 13.84%. The premises of University College Hospital with 293 trees of 12 species accounted for 82.77% of all the trees in the hospitals' premises. Jericho Nursing Home had a total number of 27 trees (7.63%) of five species, Ring Road State Hospital (RRSH) had a total number of 22 trees (6.21%) of six species, Oni Memorial Children Hospital premises had seven trees (1.98%) of three species while Adeoyo Teaching Maternity Hospital (ATMH) had five trees (1.41%) of two species. It can be observed from the results that both the population and species diversity of trees in the hospital premises were quite low with the exception of the University College Hospital. The relatively high number of trees and species in the premises of University College Hospital can be explained by the size of the teaching hospital premises which is 0.82km^{2}compared to the size of the other hospitals' premises in the metropolis. Furthermore, the layout and the landscape of the hospital premises suggest that trees must have been deliberately incorporated into the landscape ab initio. A well planned hospital premises can be a good means of biodiversity conservation for teaching and research since such environments are relatively stable and free from un-censored felling of trees except for the purpose of expansion or development of infrastructure.

In the premises of Ring Road State Hospital, *Plumeria rubra* top the list accounting for 27.27% of the total population of trees in the premises. This is followed by *Terminalia catappa* (22.72%) and the duo of *Delonix regia* and *Elaeis guineensis* which accounted for 13.64% each. In the case of Jericho Nursing Home, the duo of *Mangifera indica and Terminalia catappa* top the list with each of them accounting for 33.33% of the trees in the premises. *Delonix regia, Roystonea regia* and *Mangifera indica* were the most prominent tree species in the premises of University Teaching Hospital, respectively accounting for 20.14%, 15.02% and 13.99% of the tree population in the premises. In Oni Memorial Children Hospital, *Elaeis guineensis* accounted for 42.86%, while each of *Terminalia catappa* and *Mangifera indica* accounted for 28.57% of the population of trees in the premises. *Elaeis guineensis* again accounted for 80% of the trees in the premises of Adeoyo Teaching Maternity Hospital. It is noteworthy that *Elaeis guineensis* is the only species that is common to all the five hospital premises. There is a tendency that *Elaeis guineensis* and other fruit trees such as *Mangifera indica* and *Terminalia catappa* were not deliberately planted in the premises, but were retained during the establishment of the hospitals or were as a result of accidental dispersion of their seeds. The treescape in the premises suggests that it is only in the University College Hospital premises where deliberate planting of amenity trees took place. This observation can be supported by the relative abundance of common amenity tree species such as *Delonix regia, Plumeria rubra, Polyalthia longifolia, Roystonea regia, Pinus caribea and Samanea saman* in University College Hospital premises.

Interview with officials in the administration departments of Jericho Nursing Home, Adeoyo Teaching Maternity Hospital and Oni Memorial Children Hospital revealed that there is no unit that is saddled with the responsibility of managing the trees in these hospital premises, rather the gardeners employed to trim grasses and flowers are often assigned the duty of pruning and removal of trees' litter fall when the need for such arises. The officials further stated that the trees were not planted but rather came to existence through natural dispersion and there is no record of information on the trees since they were not under management.

The official in the administration unit of Ring Road State Hospital stated that the hospital management planted the trees over 20 years ago. No tree attribute was considered in the choice of the planted species and there are no trained staffs to manage the trees. The gardeners carry out necessary activities when the need arises.

The situation in the University Teaching Hospital is a bit different from the other four hospitals. The building department which planted the trees to provide shade and beautification continues to carry out tree planting activities in the hospital premises. The planting activities always bear in mind some salient tree attributes such as final height and environmental tolerance which must be considered in the choice of trees for amenity planting. This department is saddled with the responsibility of managing the trees. In all the hospitals studied, there is no institutional structure (policy, legal, information, funding and administrative frameworks) on ground for sustainable management of trees in the premises except for UCH, which has a semblance of administrative structure (building department) to carry out maintenance activities and plant new trees.

Table 2: Population and species composition of trees in selected hospital premises in Ibadan Metropolis

S/N	Tree Species	RRSH		JERICHO		UCH		ATMH		OMCH		Total	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	*Delonix regia*	3	13.64	3	11.11	59	20.14	0	0	0	0.00	65	18.36
2	*Mangifera indica*	0	0.00	9	33.33	41	13.99	0	0	2	28.57	52	14.69
3	*Terminalia catappa*	5	22.73	9	33.33	33	11.26	0	0	2	28.57	49	13.84
4	*Roystonea regia*	0	0.00	0	0.00	44	15.02	1	20	0	0.00	45	12.71
5	*Gliricidia sepium*	4	18.18	5	18.52	24	8.19	0	0	0	0.00	33	9.32
6	*Elaeis guineensis*	3	13.64	1	3.70	18	6.14	4	80	3	42.86	29	8.19
7	*Samanea saman*	0	0.00		0.00	29	9.90	0	0	0	0.00	29	8.19
8	*Plumeria rubra*	6	27.27		0.00	17	5.80	0	0	0	0.00	23	6.50
9	*Polyalthia longifolia*	0	0.00	0	0.00	18	6.14	0	0	0	0.00	18	5.08
10	*Pinus caribea*	1	4.55	0	0.00	4	1.37	0	0	0	0.00	5	1.41
11	*Dacryodes edulis*	0	0.00	0	0.00	4	1.37	0	0	0	0.00	4	1.13
12	*Tectona grandis*	0	0.00	0	0.00	2	0.68	0	0	0	0.00	2	0.56
Total		22	100	27	100	293	100	5	100	7	100	354	100

Evaluation of suitability of identified tree species for amenity planting

Evaluation of suitability of trees for amenity planting involves the identification of attributes of the trees and matching of those attributes with desirable and undesirable traits for trees considered for amenity purpose. The tree attributes that are often considered include: nature of tree, final height, final crown spread, growth rate, environmental tolerance and suitable habitats.

The desirable traits to be considered include: fine or interesting leaves, foliage colour or colour change, showy flowers, interesting tree form, good shading effect, hardiness or longevity and Nitrogen fixation. The undesirable traits on the other hand include: low crown base, fragile or brittle branches, top prone to wind throw, formation of buttress root, shallow roots, aggressive searching roots, non-erect or leaning bole and thorns or sharp protrusions.

The attributes, desirable and undesirable traits of the identified tree species in the premises of selected hospitals in Ibadan metropolis were compiled from Alison (2007),Edward and Dennis (1994), Hector et al. (2009), Ian (2006), iGarden (2011), KEW (2011a), KEW (2011b), Lex and Barry (2006), National Tropical Plants (2011), Southeast Growers (2011), UBC Botanical Garden and Centre for Plant Research (2011), Wikipedia (2011a), Wikipedia (2011b), Wikipedia (2011c) and World Agroforestry Centre (2011) and are presented in Table 3.

Bearing in mind that the major amenity functions of trees in hospital premises are provision of pleasant, soothing distraction to the ill (Gierlach-Spriggs et al Ibid), provision of pure air and aesthetics which accelerate the process of recuperation of patients from several ailments (Nightingale, Ibid), psychological and physiological restoration of patients and residents in the premises through reduction of blood pressure and stress levels, faster recovery for patients and therapeutic services for patients and residents of hospitals (Ulrich, (Ibid), a cursory look at the attributes and desirable traits of the identified trees shows that all the trees have one or more amenity functions to perform. Some of the traits of salient importance in this context are fine or interesting leaves, foliage colour or colour change, showy flowers, interesting tree form, good shading effect and noise mitigation

Table 3: Attributes of identified tree species in the selected hospital premises in Ibadan Metropolis

S/N	SPECIES	GROWTH FORM	FINAL HEIGHT	FINAL SPREAD	GROWTH RATE	DESIRABLE TRAITS	UNDESIRABLE TRAITS	ENVIRONMENTAL TOLERANCE	SUITABLE HABITATS
1	*Delonix regia*	D/E	C	C	C	A,B,C,D,E,G	B,D,E	A, B	A,B,D
2	*Mangifera indica*	E	C	C	C	A, D, E, F,	-	A, E	B,D
3	*Plumeria rubra*	D	A	A	A	A, B, C	A, B	D	A, B
4	*Polyalthia longifolia*	E	C	A	C	A,B, C, D E,H	-	F	A, B
5	*Roystonea regia*	P	D	B	A	A,D, G	-	A,C,F	A,B,D
6	*Terminalia catappa*	E	C	C	C	A,B, E, F	D, E	C,F	B, D, E
7	*Pinus caribea*	E	D	A	C	A, D, F	-	C	A,B
8	*Elaeis guineensis*	P	D	C	A	A, D, E, F	-	C, E	A, B
9	*Tectona grandis*	D	D	B	C	A,B,C,E	E	B	A
10	*Dacryodes edulis*	E	B	B	B	A,B, C, D	A	E	B
11	*Gliricidium sepium*	E	B	B	C	G		B	B
12	*Samanea saman*	E	C	C	C	A, B, E, F G	E	B,E	D

Source: Collated from publications

LEGEND FOR TREE ATTRIBUTES

I. NATURE/TYPE OF TREES: D=>Deciduous, E=>Evergreen, P =>Palm
II. FINAL HEIGHT: A =><8M (Short), B => 8-16m (Medium), C=>16-24m (Tall), D =>24m (very tall)
III. FINAL CROWN SPREAD: A => (4m (Narrow), B => 4-8m (Medium), C =>8m (Wide)
IV. GROWTH RATE: A => Low, B=> Medium, C=> High.
V. DESIRABLE TRAITS: A=> Fine or interesting leaves, B => Foliage colour or colour change, C => Showy flowers, D =>Interesting tree form, E => Good shading effect, F=> Hardiness or longevity, G => Nitrogen – fixation, H => Noise Mitigation.
VI. UNDESIRABLE TRAITS: A => Low crown base, B => Fragile or brittle branches, C => Top prone to wind throw, D => Formation of buttress root, E => Shallow roots, F => Aggressive searching roots, G => Non-erect or leaning bole, H => Thorns or sharp protrusions.
VII. ENVIRONMENTAL TOLERANCE: A=> poorly drained soil, B=> Infertile and skeletal soil, C => Drought, D => Shading, E => Strong wind, F => Salt spray, G => Air pollution
VIII. SUITABLE HABITATS: A => Pavement and roadside, B => Garden and open space, C => Hill slope, D => Parks and school grounds, E => Coastal, F => Sandy Beach

Awareness of goods and services derivable from trees in the hospitals' premises

The awareness of goods and services produced by trees in the working and living environment is germane and important because it determines the value the people place on the trees and consequently their disposition to the conservation of the trees. Results in Figure 2 indicate that the value of the trees in the hospitals' premises is more of service oriented. The results show that cooling the environment (25.67%), provision of shade for pedestrians and for relaxation (25.67%) and beautification of environment (24.78%) which are services collectively accounted for 76.12% of the responses while provision of fruits (17.59%) and provision of materials for phytomedicine (3.41%) which are goods derivable from the trees accounted for only 21.01% of the responses. These results imply that trees in hospital premises are better positioned to render services rather than provision of goods. Furthermore, the results also buttress the importance of trees in the mitigation of climate change since majority of the respondents (25. 67%) identified cooling the environment as benefit derivable from the presence of trees in the hospital premises. The high ranking of provision of shade for pedestrians and for relaxation (25.67%) is expected since many of the users of the premises often make use of the opportunity of the shade provided by the trees planted along the road to trek to their various destinations. Since trekking especially under shade is beneficial to individual's health, it means that provision of shades by trees for pedestrians promotes good health. Furthermore, relatives of patients who wait on the patients do relax under the trees when their attention is not needed by the patients.

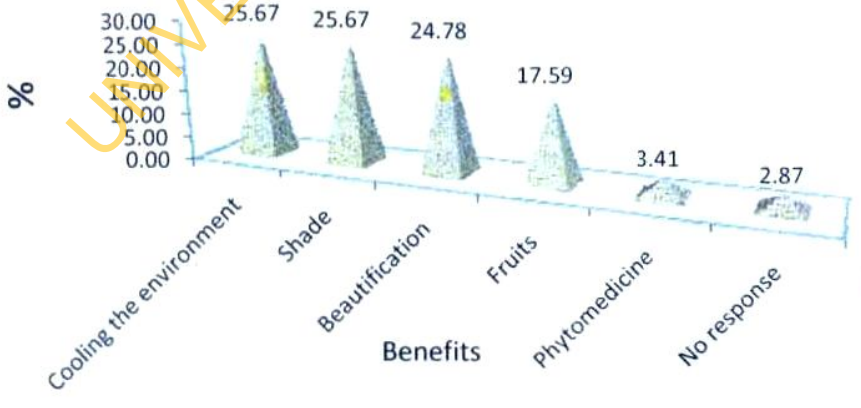

Figure 2: Awareness of Benefits of Amenity Trees in the Premises of Selected Public Hospitals in Ibadan Metropolis

Trees as hazards in hospital premises

Trees can eventually constitute hazards in hospital premises if the trees are not properly managed. Some of the possible hazards include trees falling across the roads, on vehicles, houses municipal service lines (electricity, phone, etc.). The roots of trees can also damage underground cables, road kerbs, sewers or even affect the foundation of buildings in some cases. Right choice of species and effective management are necessary to prevent and mitigate these probable hazards. Results presented in Figure 3 indicate that 76% of all the respondents were of the view that trees do not constitute hazards, while 18% were of the view that trees constitute hazards in the hospital premises. Interestingly, 30%, 22.5% and 20% of respondents from University College Hospital, Ring Road State Hospital and Jericho Nursing Home respectively, were of the opinion that trees constitute hazards in the premises. The trend of these results is quite instructive in the sense that the three foregoing premises have relatively more trees than the other two premises, and as such the probability of respondents from these three premises to have witnessed one form of tree hazard or another is high. The high proportion of the respondents from each of the hospital premises who were of the view that trees do not constitute hazards in the premises suggest that there have been no many tree hazards in the premises.

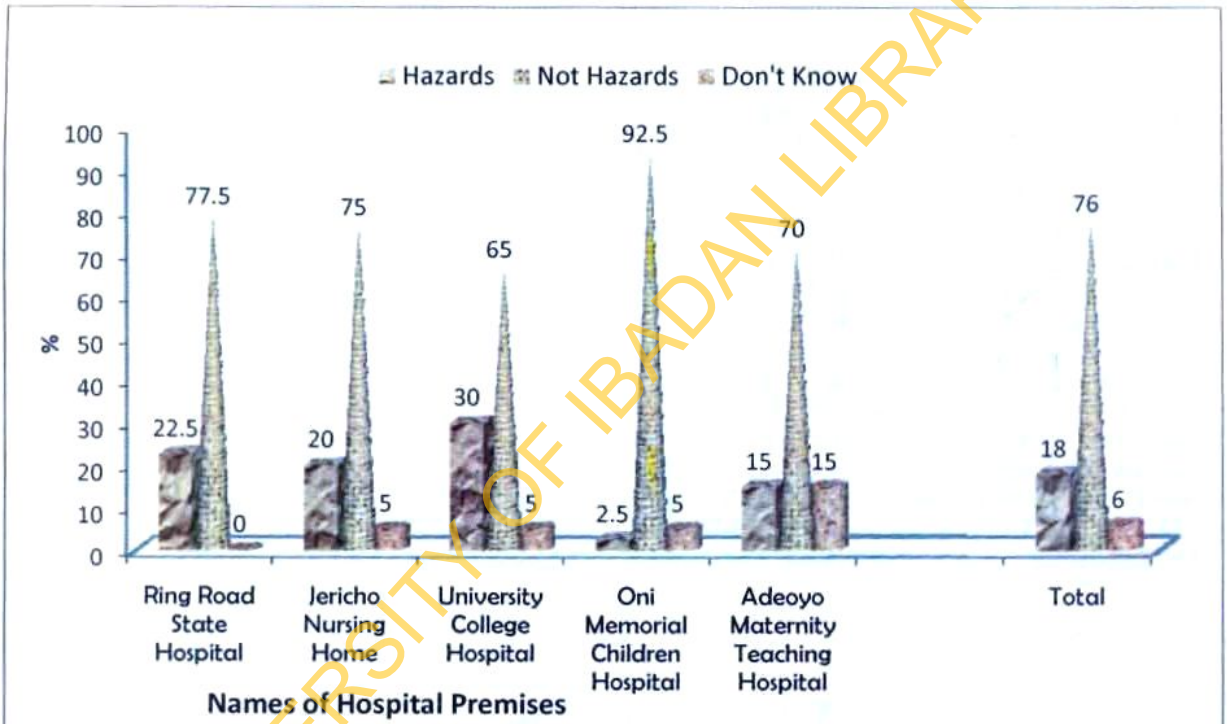

Figure 3: Perspectives on Trees as Hazards in Hospital Premises

Leaves and fruits of trees littering the premises

One of the commonest problems associated with the presence of trees in working environment in general and in hospital premises in particular is messy sight of trees' leaves and fruit litters. Common problem though, it is easily manageable if the institution has a well organised environmental sanitation unit. Results presented in Figure 4 reflect in a way the effectiveness of tree management in the premises. The results show that 58.5% of the respondents observed that leaves and fruits of trees litter the premises regularly while 21% observed that the trees litter the premises occasionally. These results are similar to the ones in each of the three premises (University College Hospital, Ring Road State Hospital and Jericho Nursing Home) with relatively more number of trees. The results suggest that the management of these premises need to improve on the cleanliness of the premises.

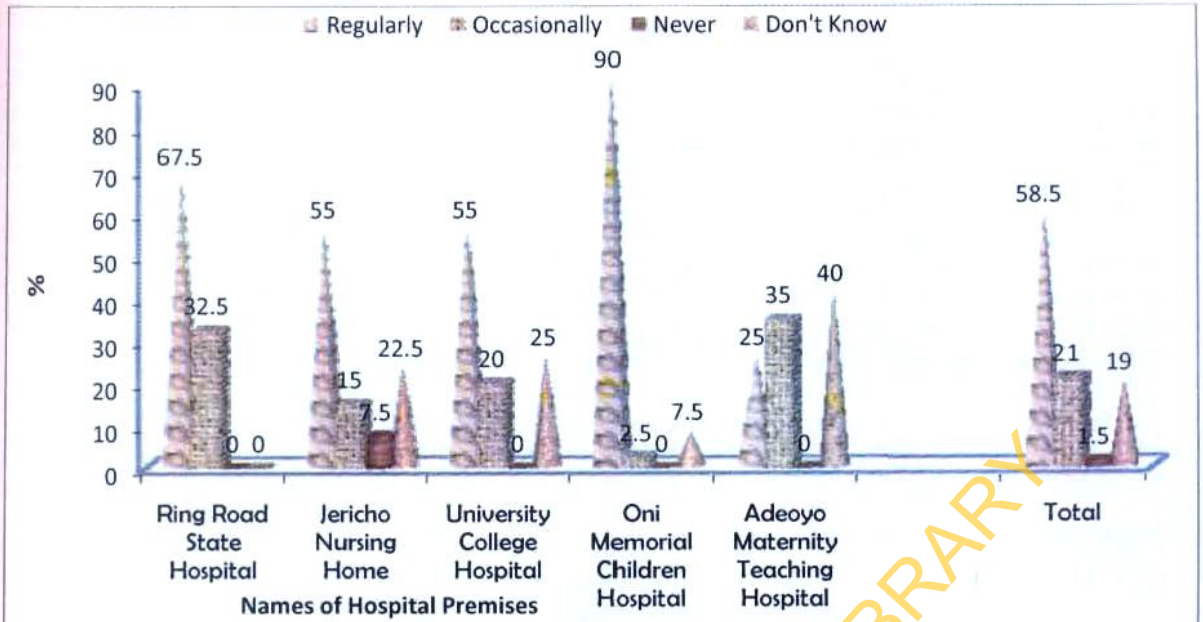

Figure 4: Frequency of Leaves and Fruits Littering the Premises

Trees falling on the road as a result of windstorms

Unlike the preceding results in which 58.5% of the respondents observed that trees leaves and fruits litter the premises regularly, only 4.2% of the respondents as can be observed from Figure 5, claimed that trees fall on the roads regularly while 66.7% claimed that trees occasionally fall on the roads as a result of windstorms. The results to some extent suggest that the trees are in good conditions and that most of the trees are not susceptible to windthrow. However, since these premises have been in existence for many years and invariably the trees would have been old, it will be important for managers of the environment to check on the trees regularly to identify weak, old or even diseased ones among them for proper handling and replacement. This will go a long way in providing a sustainable attractive, conducive, serene and therapeutic green hospital premises for all.

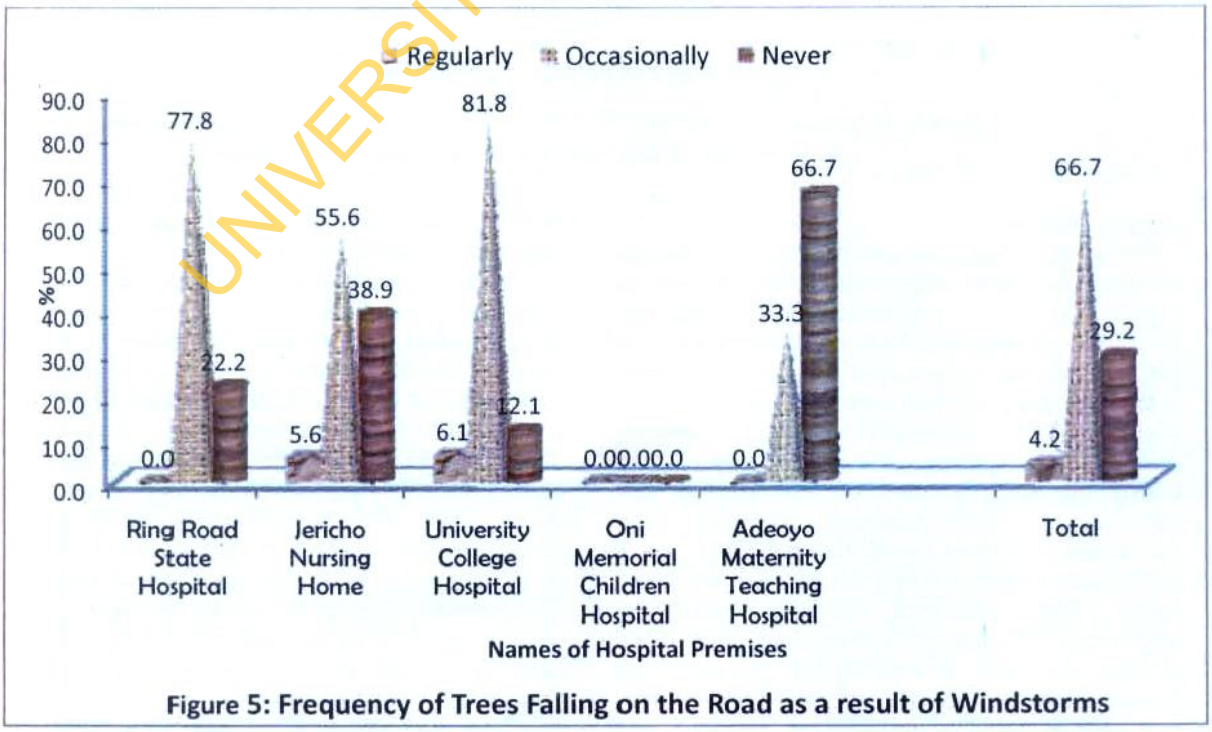

Figure 5: Frequency of Trees Falling on the Road as a result of Windstorms

Willingness to support planting of more trees in the selected hospital premises

It can be observed from Figure 6 that 58% of the respondents were willing to support planting and management of the trees in the selected hospital premises. However, of particular interest is the high proportion of the respondents from hospital premises which have few trees - Adeoyo Teaching Maternity Hospital (70%) and Oni Memorial Children Hospital (62.5%) who were willing to support planting and management of trees in hospital premises. One can deduce from these results that the respondents from premises which have relatively more trees have the tendency to take for granted the ecosystem and social services of trees until they go to environment where there are no enough trees to provide those environmental services in significant measure. On the other hand, the respondents from premises with few trees must be feeling the impact of inadequate population of trees and tree cover and will desire that there are trees in the premises.

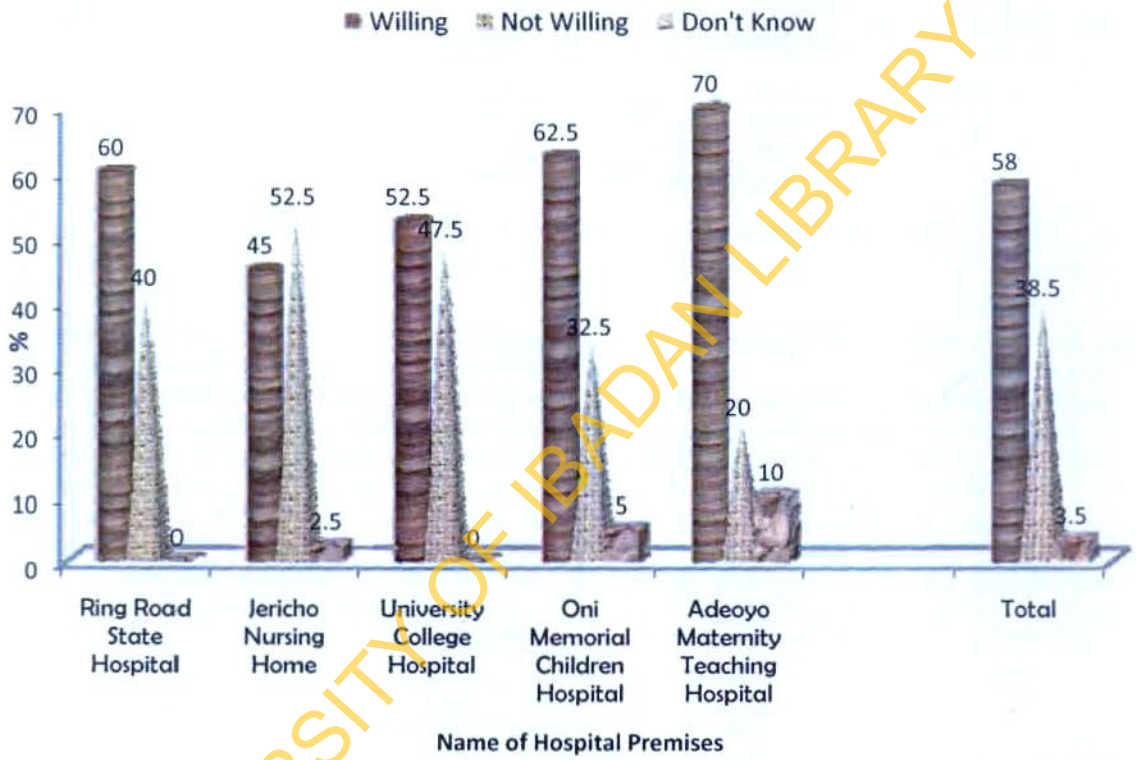

Figure 6: Fequency Distribution of Willingness to Support Planting More Trees in the Premises of Selected Hospitals in Ibadan Metropolis

CONCLUSION

This study has succeeded in providing some salient information about the treescape and its management in the premises of public hospitals in Ibadan metropolis. The study revealed that both the population and species diversity of trees in the hospital premises were quite low. With the exception of University College Hospital premises where trees were deliberately planted during the establishment of the hospital, few trees in the other hospitals' premises were deliberately retained during the establishment of the hospitals while many trees in these premises came into existence through accidental dispersion of seed. Furthermore, the study reveals the lack of institutional framework to create, fund and manage a functional treescape that can sustainably provide the required and expected environmental and social services for the patients, staff, patients' relations, residents and other users of the hospitals' premises.

The awareness of benefits of trees in hospitals' premises and the willingness to support establishment and management of these trees by the staff of the hospitals are very strong indications of the importance of trees in hospitals' premises. It therefore behoves on the hospital management to consider treescape as a basic and important infrastructure that should be incorporated into the physical planning of the hospitals. However, it is the duty of forestry professionals to draw the attention of Hospitals Management Boards to the crucial roles of trees in effective and sustainable health care delivery and to provide for the boards a sustainable functional treescape services.

This will not only provide jobs for many young foresters who will be trained on the basics

of arboriculture and employed to manage such treescape, it will also help in achieving one of the Millennium Development Goals (MDG) of enhancing biodiversity conservation since hospital premises are relatively immuned from careless and uncontrolled tree felling.

Achieving sustainable green hospital premises and attendant benefits call for the support and cooperation of all the users of the premises. Such support can come in different forms, some of which might include joining a volunteer group which will be involved in some aspects of the trees' management activities such as watering young seedlings during harsh conditions, identifying distressed, weak and or diseased trees as well as watching after the trees against vandals and animals to mention just a few.

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