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Clinico-Anatomical Study of an Anomalous Axillobrachio-palmar Artery: A Rare Arterial Duplication

By Avinash Thakur, Jyoti Arora, Rajesh Kumar Suri & Gayatri Rath
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Abstract- Introduction Morphological variations in the branching pattern of the axillary artery are of immense clinical importance and should be borne in mind prior to any axillary exploration. This study aims at emphasizing the anatomical and clinical details of one such rare variation of the axillary artery.

Methods Fifty cadaveric specimens of axilla were studied thoroughly to identify a rare, undocumented anomalous duplication of axial artery of upper limb.

Results This anomalous artery originated from the third part of the axillary artery and coursed through the brachium and ante-brachium to terminate in an incomplete superficial palmar arch and a digital branch to the middle finger. The anomalous artery had varying relations with the surrounding structures and gave numerous muscular and cutaneous branches en-route.

Keywords: *axillary artery, superficial palmar arch, digital artery, brachial plexus, carpal tunnel.*

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Clinico-Anatomical Study of an Anomalous Axillobrachiopalmar Artery: A Rare Arterial Duplication

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Conclusion Precise anatomical description of such variant branches can prove to be a boon for surgeons and radiologists performing different procedures in the axillary region. Procedures like brachial plexus blockade, radical axillary lymph node clearance and arterial stump based flap reconstruction have gained popularity in recent times and can be performed without causing unwanted complications by gaining thorough knowledge of axillary neurovascular anomalies.

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I. Introduction

Anatomical variations in the upper limb vasculature have been a topic of interest for anatomists, surgeons and radiologists owing to their significant clinical implications. Axillary artery is the continuation of subclavian artery distal to the outer border of the 1st rib to the lower border of teres major. To facilitate its anatomical description, it is divided into three parts by the pectoralis minor muscle. The first part of the artery is closely related to the axillary vein and the trunks of the brachial plexus. The second part lies deep to the pectoralis minor and the third part being distal to the lateral border of the same muscle.(1) The artery is conveniently described to give six branches from its different parts. The origin, number and course of these branches are subject to considerable variations.(2, 3) Precise knowledge of anomalous anatomical disposition of branches of axillary artery is of utmost importance to the surgeons to avoid unwanted iatrogenic complications during surgical procedures of axilla.

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II. Materials and Methods

Fifty meticulously dissected, formalin fixed cadaveric axillary specimens of both sexes were studied for course and branching pattern of axillary artery and any undocumented anatomical variation (14 female and 36 males). Classical incisions were given to expose the artery and retain all its branches.

III. Results

In a detailed pilot study of the axillary artery in fifty cases, a unique case of duplication of axillary artery was noted in the third part. The third part of axillary artery gave rise to an anomalous artery (AA) which coursed through the arm and forearm and terminated in the palm to form an incomplete superficial palmar arch. AA was accompanied by a venae comitantes in its entire course.

In the axilla, this anomolous artery took origin 1.8 cms proximal to the origin of posterior circumflex humeral artery and 1.5 cms above the union of the medial and lateral roots of median nerve (fig 1). The AA was the lateral most structure in the axilla, medial only to the musculocutaneous nerve.

In the arm, AA coursed superficial to the coracobrachialis muscle, continued to course on the biceps brachii muscle and gave it a muscular branch to finally reach the cubital fossa. In the upper one third of arm, the median nerve was sandwiched between the AA and the brachial artery. Interestingly, in the lower third of the arm, the AA coursed obliquely to cross the median nerve and brachial artery superficially from lateral to medial side to finally become the medial most structure in the cubital fossa.

In the cubital fossa, the AA was the medial most structure, lateral only to the basilic vein (fig 2) and provided two prominent cutaneous branches to the skin of the cubital fossa. The AA coursed further in the forearm to lay along its medial border, superficial to flexor carpi radialis (FCR) and flexor digitorum superficialis (FDS). Here, the AA gave one muscular branch to the Palmaris longus and two muscular

branches to the FDS. It coursed between FCR and flexor digitorum profundus and continued along the medial border of FCR to enter the carpal tunnel to reappear in the palm (fig 3). Just above the proximal border of flexor retinaculum, the AA was medial to the median nerve and radial artery.

In the palm, the AA displayed bifurcation, 2.3 cms distal to the radial styloid process, into a medial and a lateral branch. The medial branch joined the superficial branch of ulnar artery which formed an incomplete superficial palmar arch. The lateral branch continued as a proper digital branch to the middle finger (fig 4, fig 5).

IV. Discussion

Course and branching pattern of axillary artery frequently show variations and there are several detailed studies in the literature to highlight this.(4) The present study describes a unique undocumented anomaly of the axillary artery in the arm, forearm and palm with prominent muscular branches from the AA and also its valuable arterial contribution to the hand. Axial artery of the upper limb is derived from the lateral branch of seventh cervical intersegmental artery. This axial artery further divides into axillary, brachial, radial and ulnar arteries.(5) Anatomical variations in the axillary artery branching is a result of developmental disturbance in the formation of the upper limb vascular plexus. Anomalous branches may arise from the artery as a result of excessive branching of the vascular bud.(6) The upper limb arteries develop in five stages. An axial arterial pattern represented in the adult by axillary artery, brachial artery and interosseus artery of the forearm develops first while other branches develop later from the axial system. In the later stages the median artery branches from the anterior interosseous artery and the ulnar artery branches from the brachial artery respectively. In the further course of development a superficial brachial artery arises from the axillary artery and it continues as radial artery. Regression of the median artery and an anastomosis between the brachial artery and superficial brachial artery with regression of the proximal segment of the latter gives rise to the definitive radial artery. The anomalies can be explained by the persistence of embryological vessels.(7, 8) Genetic constitution, fetal positioning in-utero and abnormal musculature can also be the etiological factors for abnormal vascular development.(9) Studies have shown that anomalies of the vascular pattern cause delay in palmar arch differentiation.(10

A strikingly rare anomaly is for the axillary artery to duplicate in the axilla into brachial artery and a superficial artery which in the past has been referred to as superficial brachial artery.(11) In the present study, a rare anomalous artery (AA) branched off from the third part of the axillary artery and demonstrated significant differences in its course, relations and branches as compared to the previously described variant branches of the axillary artery. Studies report the duplication of third part of axillary artery into brachial and superficial branches. The reported incidence of such bifurcation is 0.12- 3.2 %. The superficial branch terminated in the cubital fossa.(12) Bifurcation of axillary artery into almost equal size trunks has also been reported. The superficial among the two continued as the brachial artery. The abnormal deep trunk bifurcated into a common circumflex humeral- subscapular trunk and a profunda brachii artery.(13) Studies describe a rare case of axillo-palmar artery replacing the superficial palmar arch with regression of the ulnar artery.(14) Literature holds evidence and description of five to eleven branches arising directly from the axillary artery, the most common number being eight.(15) Two to seven branches arising from the axillary artery have also been reported in the literature.(16) A high division of radial artery together with superficial palmar arch formed entirely by the ulnar artery has been reported.(10) Interestingly, in our case the AA itself contributes to the formation of superficial palmar arch by joining it at its termination. The superficial palmar arch was thus formed by the medial branch of the AA and superficial branch of the ulnar artery whereas the lateral branch of the AA continued as proper digital branch to the medial side of the middle finger. Such arterial variations need to be identified as they may pose a surgical challenge to the plastic and orthopedic surgeons operating in the region of forearm and hand. The superficial position of the AA as in the present case may make it extremely vulnerable to trauma and at the same time easily accessible for cannulation procedures. Knowledge of such anomalous Axillobrachiopalmar arteries is significant for the plastic surgeon while raising a radial or ulnar artery flap.(17) In a previous study, the superficial branch of the anomalous axillary artery gave no branches to the neighboring structures in the arm.(18) However, in our case the AA gave numerous muscular and cutaneous branches throughout the arm and forearm and finally terminated in the palm. This study aims at providing an insight into the clinically relevant variations of axillary artery and contributes additional data to existing anatomical literature. Accurate knowledge of axillary arterial variations becomes eminent for performing reparative and angiographic procedures as upper limb arterial flaps and reconstructive surgeries are gaining popularity in the recent times.(19, 20) Presence of such occult branches of axillary artery can become a hindrance, especially in cases of arterio-venous fistulae, lymph node clearance and arterial aneurysms.(21) Orthopedic relocations of dislocated shoulder joint can cause injury of such variant branches of axillary artery, especially if they are adherent to the articular capsule.(22)

V. Conclusion

We as anatomists, opine that such anomalous arterial patterns may lead to confusion in interpretation of angiographic patterns which in turn may cause life threatening complications. Abnormal branching pattern of axillary artery may also present an abnormal relationship to brachial plexus and other neurovascular structures. The variations in the origin, course and branching pattern of the Axillobrachiopalmar artery is hence impertinent for accurate diagnostic interpretation.

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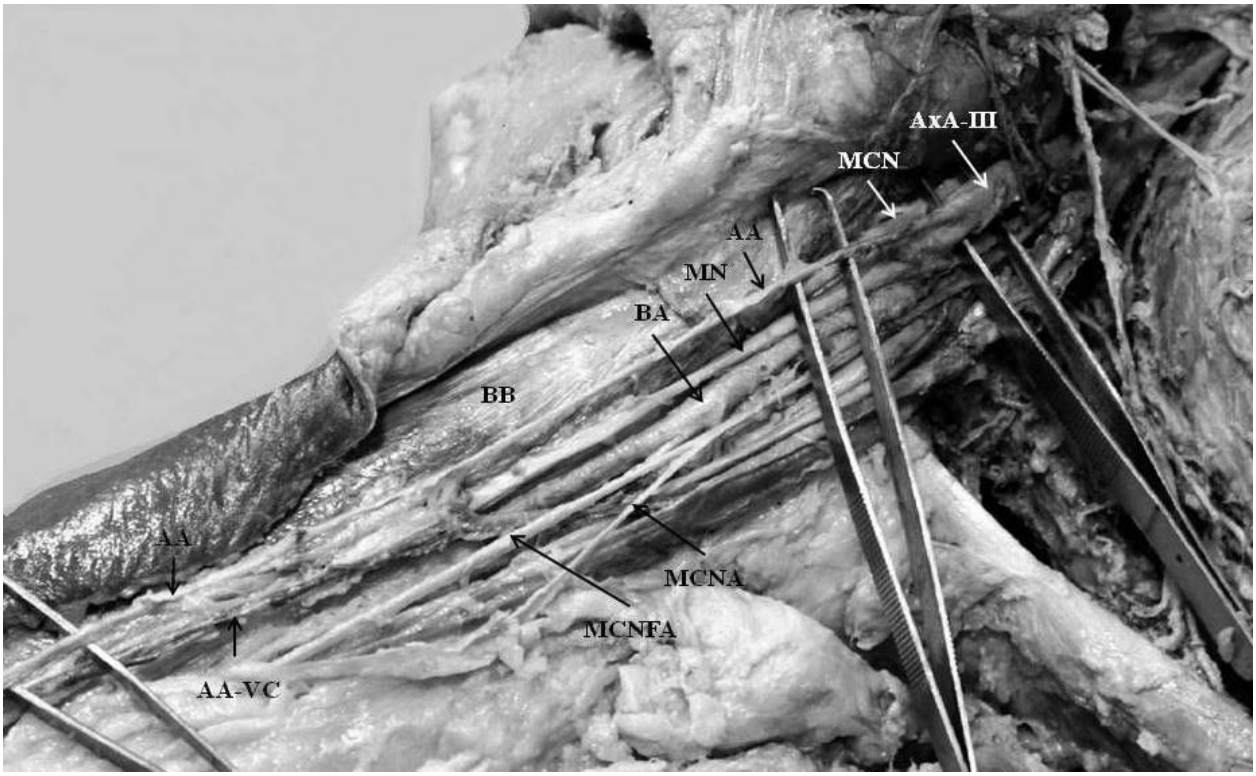
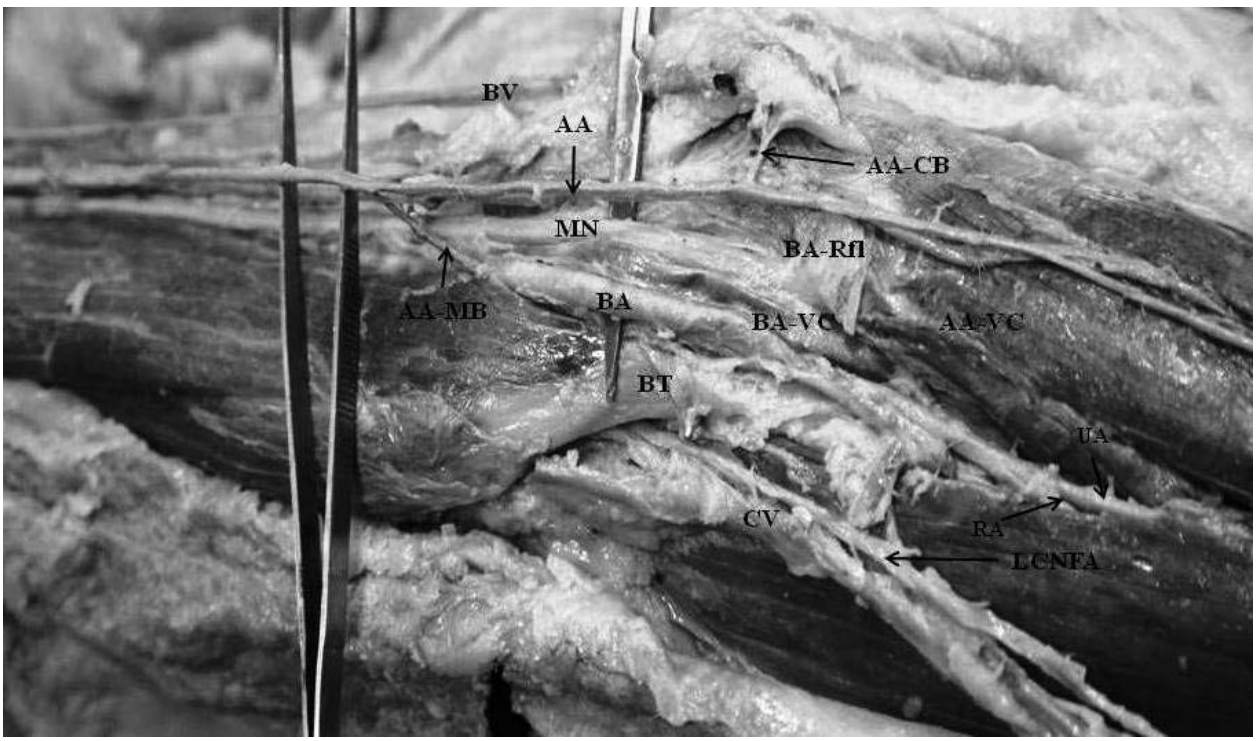


Figure. 1



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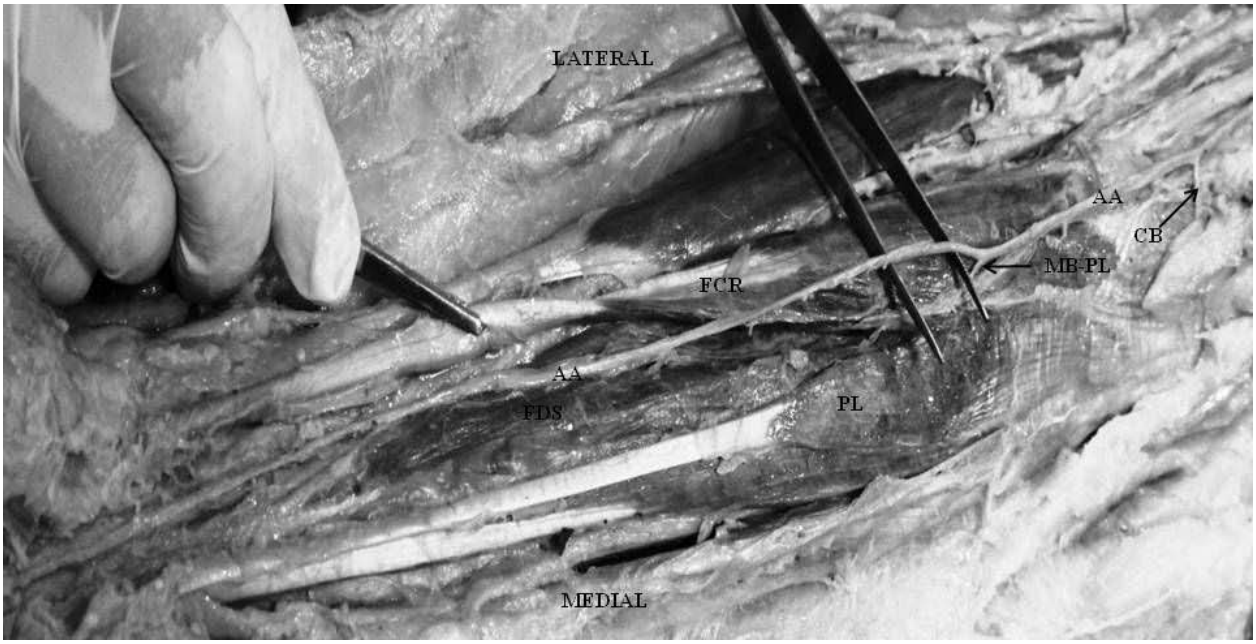

Figure. 3

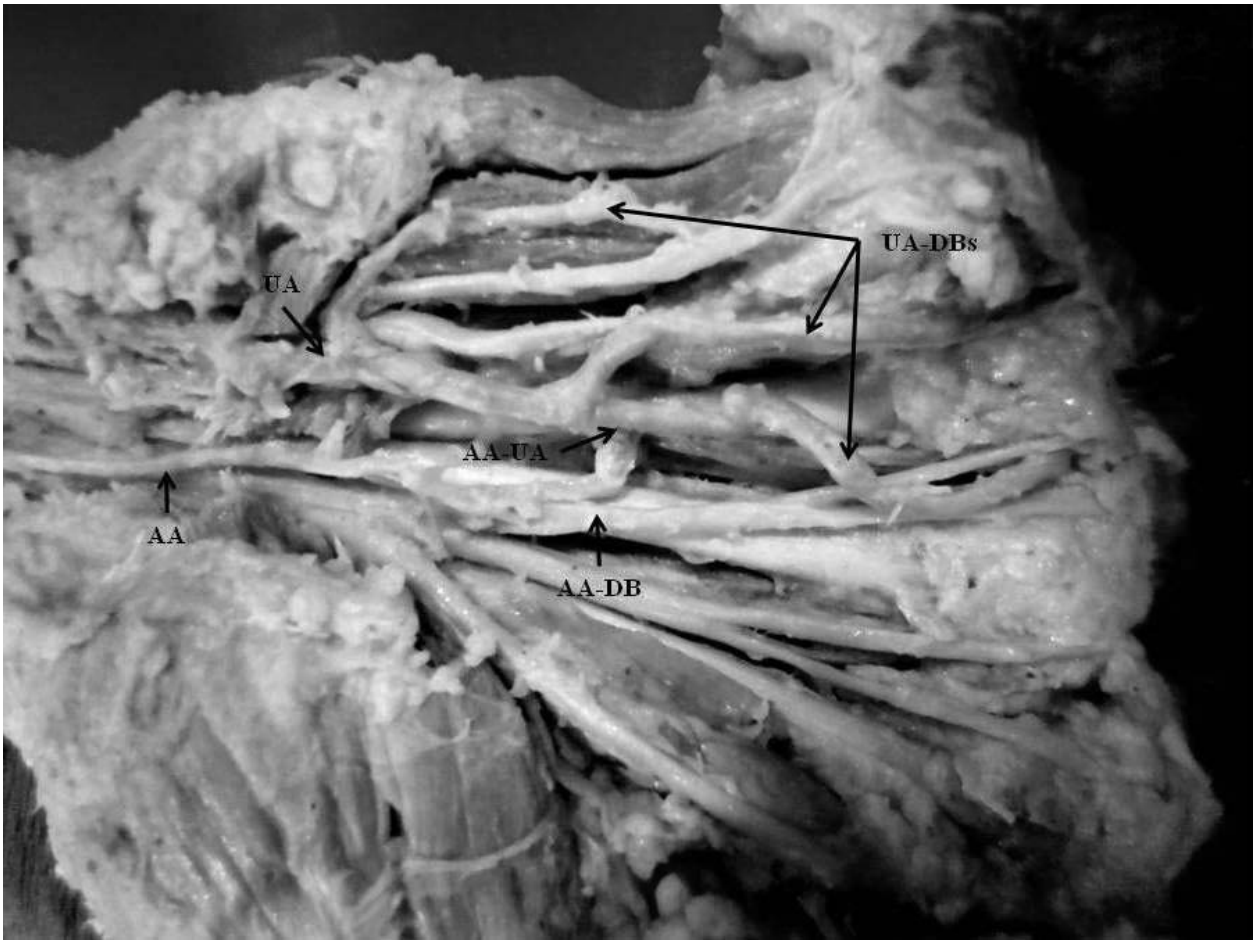

Figure. 4

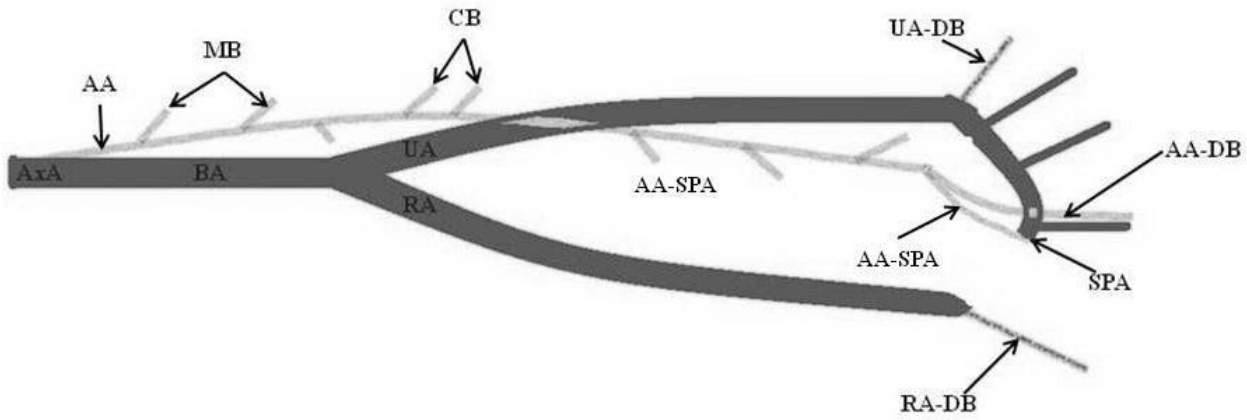

Figure.5

Figure Legends

Fig. 1 shows the origin of the anomalous artery. AxA-III- third part of axillary artery, MCN- musculocutaneous nerve, AA- anomalous artery, MN- median nerve, BA- brachial artery, BB- biceps brachii, MCNA- medial cutaneous nerve of arm, MCNFA- medial cutaneous nerve of forearm, AA-VC- venae comitantes of anomalous artery.

Fig. 2 shows the relations of the AA in the cubital fossa. AA-MB- anomalous artery-muscular branch, BA- brachial artery, BT- biceps tendon, CV- cephalic vein, LCNFA- lateral cutaneous nerve of forearm, BV- basilic vein, AA- anomalous artery, MN- median nerve, AA-CB- anomalous artery-cutaneous branch, BA-Rfl.- bicipital aponeurosis reflected, BA-VC- brachial artery venae comitantes, AA-VC- anomalous artery venae comitantes.

Fig. 3 shows the relation of anomalous artery in the forearm. AA-anomalous artery, PL-palmaris longus, FCR-flexor carpi radialis, FDS-flexor digitorum superficialis, CB-cutaneous branch, MB-PL – muscular branch to Palmaris longus.

Fig. 4 shows the termination of the anomalous artery. AA- anomalous artery, UA- ulnar artery, AA-UA- anomalous artery branch joining the ulnar artery, AA-DB- anomalous artery-digital branch, UA-DBs- ulnar artery-digital branches.

Fig. 5 AA- anomalous artery, AxA- axillary artery, BA- brachial artery, MB- muscular branches, CB- cutaneous branches, UA- ulnar artery, RA- radial artery, SPA- superficial palmar arch, AA-SPA- anomalous artery branch joining the SPA, AA-DB- anomalous artery-digital branch, UA-DB- deep branch of ulnar artery, RA-DB- deep branch of radial artery.

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Vulture: Distribution, Feeding, Habitation, Breeding and Population Dynamics

By Ramprakash Saran & A. Purohit
J.N.V. University, India

Abstract- Vultures are nature's most successful scavengers and they provide an array of ecological, economic and cultural services. As the only known obligate scavengers, vultures are uniquely adapted to a scavenging lifestyle. In the present review we critically analyzed distribution pattern, feeding status, habitat selection, breeding patterns and dynamics of the vulture population. The study suggested that there is an urgent need to protect the nesting sites for vulture breeding and austere use of drugs to maintain the population dynamics.

Keywords: *vulture, nesting sites, food, dynamics.*

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Vulture: Distribution, Feeding, Habitation, Breeding and Population Dynamics

Ramprakash Saran [α] & A. Purohit [σ]

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Keywords: vulture, nesting sites, food, dynamics.

I. Introduction

Birds are not only part of our natural heritage but also important components of our cultural history from the antiquity until recently. Vultures are always present in Greek legends and traditions. Vulture names differ from place to place. Egyptian Vultures, named "Cuckoo's horses", which carry migrating Cuckoos on their backs. Vultures' arrival is linked with children's couplets and magic actions for health, fortune, marriage and success in dairy products. In other places Egyptian Vulture is called "cheese maker". Moreover, the bird's body is used in folk medicine. Griffon Vultures are present in every day sayings, characterizing lazy, boorish or gluttonous people. Fairy tales personalize Vultures and eagles as shepherds, while in local traditions sheep are transformed to Griffon Vultures due to the supernatural punishments of shepherd's inhospitable behavior.

Vultures ate unburied people killed in wars and legends mentions that heroes were eaten by eagles. Instruments of pastoral music tradition are also associated with Vultures. Children used to collect flight feathers and sell them to local lute players and flutes were frequently constructed from the ulna bone of the wing of Griffon Vultures or Golden Eagles. Nevertheless, those bones had to remain 40 Sundays in church before use, to be purified. Lastly, many place names refer to Vultures, but after their population decline, people rarely associate those toponyms with these birds. In holybook, Ramayana there are descriptions about Vulture like bird Jatau which fight with Ravan till death to protect Sita Devi.

Folk history and legend remain for longer time than birds themselves, but if we want to involve local people in nature conservation it is crucial to involve local people in nature conservation to create an environment for endangered species apart from making them aware of legends and folk history associated with Vultures (Stara et al., 2005). From ecological point of view Vultures are important components of ecosystem for cleaning the dead carcasses and provide healthy environment to other living beings. Vultures are nature's most successful scavengers and they provide an array of ecological, economic and cultural services. As the only known obligate scavengers, vultures are uniquely adapted to a scavenging lifestyle. Vultures' unique adaptations include soaring flight, keen eyesight and extremely low pH levels in their stomachs (Balmford, 2013). In the present review we critically analyzed distribution, feeding, habitation, breeding and population dynamics of vulture.

II. Taxonomic Status and Distribution

Presently 14 of 23 (61%) vulture species worldwide are threatened with extinction and the most rapid declines have occurred in the vulture-rich regions of Asia and Africa (Ogada et al., 2012). Vultures are classified in two categories i.e. new world Vulture and old world Vulture. New world Vulture belongs to family Vulturidae, which consists of seven living species, and old world Vulture belongs to family Accepitridae which consists of 16 living species. Both old world and new world Vultures are scavengers in nature and feed mostly on carcasses of dead animals. Similarities between two groups of Vultures are due to convergent evolution. Fossils record of the family Vulturidae indicate that this family was diverse and probably originated in Europe or Asia (Olson, 1978) and no fossils record of Vulturids younger than early Miocene (25 million year ago) are known in the old world (Craft and Rich, 1972). The family has become restricted to the new world Vulture, where the earliest record is from the late Oligocene.

Backer (1986) stated that Condors were large size distinct Vultures where ever they probably originated. Extinct species include the Andean Condor (Vulture grythus), California Condor (Gymnogyps californianus) and King Vulture (Sacroramphus papa) is intermediate in character between the Condor and the smaller vulturids (Cathartes, Coragyps) (Fisher, 1946). Recently two discoveries gave detail about fossils' histories and evolution of Vulture, the first was a partial skeleton of early Condor closely related to California Condor (Gymnnogyps californianus) from the early

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Pleistocene of Florida and the second is single complete torso metatarsus bone from the middle Miocene of California. This specimen has character of typical Vulturidae, including a mordantly developed inter cotylar prominence, rectangular hypo tarsus without a bony canal, deep and long ante (Cracraft and Rich, 1972).

Globally, there are 23 species of vultures, of which the majority occur in the Old World and within the family Accipitridae. Accipitridae is a diverse avian family, comprising up to 14 sub - families, 65 genera and 231 species. Some species in family Acciptridae are most threatened by anthropogenic factors belongs to 4 eagles subfamilies (Orrcaetinae, Haliaeetinae, Aqualinae and Hariinae and old world Vulture subfamilies Gypatinae and Aegypiinae). All Accipitridae species are protected under the Convention on International Trade in Endangered Species (CITES). In general Vultures do not kill their prey but have occupied a special ecological niche by feeding on carrion. The remaining seven species comprise the New World Cathartidae family. Most species occupy a range within one continent comprised of two or more countries. Four species, the Griffon vulture (Gyps fulvus), Bearded vulture (Gypaetus barbatus), Egyptian vulture (Neophron percnopterus), and Cinereous vulture (Aegypius monachus), have or historically had large ranges that span three continents. Two species, Turkey (Cathartes aura) and Black vultures (Coragyps atratus), range widely within both North and South America. Cape vultures (G. coprotheres) in southern Africa and California condors (Gymnogyps californianus) in North America have historically small ranges, though fossil evidence suggests that California condors were once found throughout the United States, southern Canada, and northern Mexico. Vulture-rich regions include Central and South America, South Asia, and Africa.

III. Food and Feeding Pattern in Vulture

It was observed that old world Vultures are thought to partition or compete for several types of resources. In Africa, where Vulture species diversity is highest, there is evidence that they compete for food (Hertel, 1994). Co-existence of two ecologically similar species within a habitat is achieved by the evolution of some degree of difference in resource use. By feeding on different foods, at different sites, or with different foraging behaviors, species can avoid competitive exclusion. Avian scavengers which feed upon an unpredictable and ephemeral resource may finely divide their food resource along one or more resource axes in order to survive. Wallace and Temple (1987) demonstrated that scavengers presented with very large carcasses in open habitat showed interference competition by establishing a dominance hierarchy among species locating the resource.

The guild of New World avian scavengers formed a dominance hierarchy with Andean Condors (Vulture gryphus) on top, followed by King Vultures (Sarcorumphus papa), Crested Caracaras (Polyborus plancus), Turkey Vultures (Cathnrtes aura), and Black Vultures (Corugyps utratus), in that order. Lemon (1991) studied about feeding pattern in Vulture and observed that feeding at large carcasses in open areas that were frequented by all the species of scavengers in the guild. The largest carcasses were opened to make them available to small scavengers and larger scavengers at the same time. More than half of the carcasses provided were burros (Equus asinus). In the forested areas of the tropics, this type of resource is unavailable.

Houston (1984) studied about searching and feeding pattern in Vultures and showed that most of the biomass available to Vultures on Barro Colorado Island, Panama, came from animals with masses less than 3 kg. Differences in foraging behavior and sensory physiology may make carrion in forest habitats less available to some species of scavengers than to others. Niche overlap may be quite different for avian scavengers feeding on small carcasses.

Vultures feed on an unpredictable and ephemeral resource. Vultures have sharp vision and good olfactory cues which play an important role in searching of food. Most of their foraging energy is spent searching for carrion, and when they find carrion, they are observed by other Vultures which quickly follow them to the food source. The carcasses they feed upon are usually not large enough to allow all Vultures to feed without some intra-specific or inter specific competition. The carcasses decompose rapidly and are only available to the Vultures during a brief time period. As a result, many Vultures are forced to feed upon a limited resource at essentially the same time. Cathartid Vultures in the lowland tropical rain forest of Costa Rica partition their feeding behavior spatially and temporally. A similar guild structure has been seen in Accipitrid Vultures in East Africa (Krunk, 1967).

The method that Vultures use to locate carrion also affects the temporal segregation of feeding. The species that feeds on a carcass first should be the species that detects it first. Turkey Vultures probably use olfactory cues to locate food while Black Vultures rely on vision (Smith and Paselk, 1986).

Stewart (1978) studied about arrival of Vultures on carcasses into different location i.e. at one place carcass placed in open area while another carcass placed under forest canopy and suggested that Black Vultures seem to follow Turkey Vultures to carrion. Black Vultures arrived first at carcasses in the open where they were highly visible, but arrived second at carcasses under the forest canopy where olfactory cues may have been more important. It appears that the species that

was most proficient at detecting carrion in each habitat arrived first. The less proficient species had to rely on cues from the other species to provide information about the location of food. Carrion placed in the open gap habitat was located quickly because more species were proficient at detecting it. All Cathartid Vultures have acute eyesight and are able to find carcasses that are visible from above. Carcasses that were on the forest floor were harder to detect. Only those species that have the ability to detect carrion by using non-visual cues could locate it. As a result, feeding began later on carrion in primary and secondary rain forest than it did in the gap habitat.

Little is known about the foraging behavior or physiology of King Vultures and Lesser Yellow-Headed Vultures. Houston (1984) suggested that King Vultures were unable to detect carrion by the use of olfactory cues. Lemon (1991) studied about feeding behaviour of Vulture at different carcasses position and stated that the composition and behavior of feeding aggregations were different, depending upon where the food was located. When carrion was placed in the open gap habitat, either Turkey Vultures or Black Vultures were the first species to arrive and feed. Feeding aggregations in the gap habitat could be very large with three or four species represented, but no inter-specific aggression or even casual displacement was observed. Intra-specific aggression was common only among Black Vultures.

In the secondary forest, perhaps due to limited visibility and open ground, Black Vultures and Turkey Vultures foraged and fed individually or in small single species and mixed species groups. No inter-specific aggressive encounters or displacements were seen. Under the primary forest canopy, where carcasses were obscured from view of birds above the canopy, Turkey Vultures or Ring Vultures were the first species to arrive. Ring Vultures were frequently the first birds to locate a carcass and would feed upon it before Turkey Vultures arrived. On one occasion, Turkey Vultures located a carcass 15 meter away from the edge of a gap in the primary rain forest and approached the carcass from downwind, flying back and forth perpendicular to the wind direction. As they were approaching and descending toward the carcass, a large group of Black Vultures from a nearby roost tree joined them. The Turkey Vultures began feeding first, and the Black Vultures began feeding moment's later.

Sidiropoulos et al., (2005) studied about the utilization of an Artificial Feeding Site (AFS) by carrion eating birds in Pinovo, a mountain chain near the northern Greek borders, which is one of the most important areas for Raptor conservation in the Balkans and observed seasonal variation among different species of Raptors. Of the 31 species of birds of prey recorded in the area, including all four species of European Vultures were observed feeding, along with corvids. Raven was the most regularly observed species, followed by the Golden Eagle, especially in winter. The Egyptian Vulture was the most regular Vulture species in the AFS during spring and summer months, while Griffon Vultures were abundant in autumn. Especially in autumn Griffon Vultures concentrated and some remain in the area up until late November, because of the continued supplementing of the AFS. The Bearded Vulture seems to use the AFS mainly from late winter to early spring, coinciding with its regular presence in the area. Common Ravens may appear in large concentrations all year-round.

Rebnold (1987) studied about searching behaviour of food in Black Vultures and observed that adults arrived at baited sites earlier than young adults and juveniles. During natural roost departures, adults were as likely to depart at the head of departing groups as at the rear, while young were concentrated in the rear. Birds removed experimentally from the population long enough to be naive about the location of food followed others from the roost when reintroduced. Control adults (birds caught and handled but not restrained for long) were not concentrated in the rear of roost-departing groups, as were experimental adults. Juveniles tended to follow regardless of recent experience.

Krik et al., (1995) investigated the role of social dominance in habitat use by flocking migrant and resident Turkey Vultures (Cathartes aura meridionalis and Cathartes aura ruficollis). Migrants foraged primarily in savanna habitats while residents foraged almost exclusively in gallery forest. In the gallery forest residents discovered carrion first significantly more often than migrants, despite there being equal densities of residents and migrants foraging over this habitat. Because residents fed in smaller groups than migrants at carcasses they had higher feeding rates. There was also a negative relationship between group sizes of residents and migrants. The feeding rate of residents declined in response to increased group size of migrants, but group size of residents had no effect. Migrant group size also had a greater effect on resident feeding rates than King Vulture presence or absence.

The effect of migrant and resident group size on feeding rates in migrants was compared, the most significant factor was migrant group size. A second analysis showed that both resident group size and presence or absence of king Vultures had a significant effect on feeding rates in migrants. Rates of agonistic encounters in migrant and resident Turkey Vultures increased weakly in relation to group size. However, there was an increase in residents' encounter rate with migrants in relation to increased migrant group size. Migrants dominated residents in almost all agonistic interactions over carcasses and suggested that savanna habitats were less attractive to residents for foraging because they held larger groups of migrants.

Animal carcasses appear with a variable spatio-temporal predictability (Ostfeld and Keesing, 2000) and affect ecosystem diversity and functioning. They provide the primary food resource for guilds of scavengers composed not only of specialist but also of facultative carnivore and avian scavengers (Wilmers et al., 2003). These aggregations of facultative scavengers, which are also important predators, can increase predatory pressure in the area surrounding carcasses having profound impacts on prey species (Avizanda et al., 2009).

A particular case are the so-called 'Vulture restaurants' (places with a constant carcass supply) which are increasingly considered key management tools in the worldwide conservation of endangered scavenger populations (Koenig, 2006). However, this management action can trigger local scale processes associated with the attractiveness of Vulture restaurants for facultative scavengers (Piper, 2006).

Carcasses can play an important role in ecosystem diversity and community structure (Devault et al., 2003). Fresh carcasses in the form of scattered and concentrated at predictable sites such as Vulture restaurants, can increase nest predation risk in their immediate surroundings due to the aggregation of scavengers which are also facultative predators. The area with a relatively simple vertebrate community, should be taken into account when considering other regions where much more complex assemblages of carrion-eaters with broad trophic niches are present (Travaini et al., 1998).

The Vulture restaurant is a special case of a carcass site where facultative scavengers concentrate permanently because of a constant food supply. There, the probability of predation risk could be persistent over time, having a stronger effect on the population dynamics of prey species. Previous studies by Kristan and Boarman; 2003 and Avizanda et al., 2009 support this possibility.

Bertan et al., (2004) studied about inter-species interaction and suggested that aggressive interactions between Bearded Vultures and Ravens are the result of the coexistence between one species whose feeding habits facilitate kleptoparasitism and another species that is highly opportunistic and constitutes a potential predator. The aggressive behaviour of Bearded Vultures towards Ravens appears to be directly associated with the defense of the nests and its intensity is related to the age of the chicks and supported by the fact that most attacks (92%) were initiated from the nests or adjacent sites. Aggressive behaviour frequently much high during hatching period and the first month of the chick's life when vulnerability to predation is higher. It was not found that pairs which received a higher frequency of attacks in their nesting areas displayed a higher defensive in-both the difference in the size of the two species and the type of food manipulated by the Bearded Vulture affect the Raven's parasitic efficiency.

The negative effects of coexisting with the Common Raven for the Bearded Vulture appear to be more closely associated with the costs derived from nest defense and nesting space. However, although the frequency of intrusions by the Raven in the nests might be considered low, the Bearded Vulture's defensive behaviour suggests there are real predation risks during the initial phases of the breeding period when the chicks (due to their size)may be more vulnerable.

IV. Nesting and Roosting Pattern in Vulture

Snow and Pernis (1998) studied about nesting and roosting pattern in three species of Vulture i.e. Himalayan Griffon, Eurasian Griffon and Lammergeier Vulture and estimated that all three species probably nest at the same time on the Tibetan plateau. Egg-laying by Lammergeiers on the Tibetan plateau occurs in late February or early March. For Himalayan Griffon, if the duration of the breeding cycle is similar to that of Eurasian Griffons in Europe, then initiation of nesting on the Tibetan plateau should occur in about early March (Snow and Perrins, 1998). Saker Falcon chicks have been observed in nests on the plateau in June and in nearby low land central Asia their chicks fledge in early July.

Due to low nest site availability these birds may have been forced to nest in closer proximity to each other than usual. Third, in nearly all other areas where Lammergeier and Eurasian or Himalayan Griffons coexist, they share resources with a third species of Vulture. Because these two species are the only large Vultures in this region (Cinereous Vultures are uncommon in this part of Qinghai), inter-specific competition may be less than in other places where they co-exist. Eurasian Griffon colony size and level of aggression by Lammergeiers have been shown to be positively correlated (Bertran and Margalida, 2002). Himalayan Griffons, because of their semi- or non-colonial nesting, may provoke less response from Lammergeiers.

Katzner (2004) stated that Saker Falcon Falco cherrug at the cliff exhibiting apparently territorial behaviour. When approached the cliff, the bird flew repeatedly from a roost circled above the area calling extensively, and returned to the cliff face. Although by this way unable to determine the age of this bird or to locate a nest, this bird's behaviour was consistent with that observed at Saker Falcon nests with chicks in other locations in the region.

Lambertucci et al., (2008) states that new world Vulture Andean Condors use cliffs with shelves as communal roosts in northwestern Patagonia, Argentina. There was a strong seasonal pattern in roost use and

use also varied among roosts, possibly due to differences in their environmental characteristics, size, and room available for roosting, as well as proximity to nest sites and stage of the breeding season. Differential use of roosts among age classes, spatial segregation seems probable and concludes that intensive censuses of communal roosts can provide useful information about the size, status, and dynamics of local populations.

To determine Vultures nest properties and nest trees characteristic study was carried out in Europe. Nest structure was detected and nest-tree characteristics evaluated in the Türkmenbaba Mountain, Eskisehir (northwestern Turkey), where the largest Aegypius monachus colony in the country exists. Individual nest and nest trees preferences were identified. The diameter axis of nest, diameter axis of nest cup and nest thickness as nest properties and tree species, height of nest tree, diameter at breast height (DBH), aspect of tree, trunk shape, nest-tree branches, the conditions of nest tree and crown class of nest tree as nest tree characteristics were examined. The nest structure measurements indicated that the mean nest diameter was 176.9 ± 42.63 cm, nest thickness was 37.13 ± 15.05 cm. and cup diameter was 62.11 ± 10.49 cm.

Aegypius monachus invariably nests on flat-topped Pinus nigra trees with a height of 11.47 ± 3.87 m. (mean ± SE) and DBH of 42.91 ± 7.36 cm. Aegypius monachus showed a preference for building their nest on trees containing <20 branches per trunk and intermediate or upper level of canopy. Aegypius monachus prefers older and mature Pinus nigra trees in Türkmenbaba Mountain. Therefore, the preservation of these kind of trees is essential for the survival of the species and should be incorporated into management plans (Yamac et al., 2005).

In Spain, the study about age determination of chicks in nest was carried out by attaching transmitters. It is often very useful to know the age of chicks in the nest. For instance, if activities such as ringing or attaching transmitters are to be carried out correctly, it is essential to know the age of the pulli before accessing the nest. If chicks are tagged at the wrong age there is the risk of unnecessary disturbance or even serious problems. The monitoring of a Black Vulture colony comprises relatively few visits to the colony, so it is not being possible to accurately determine the laying or hatching dates for most of the clutches. With this information and knowledge of the average incubation period for the species, it would be possible to accurately estimate the age of pulli in the nest that can be seen well through a telescope. Twelve development stages of the pullus, specifically 10-day periods, from birth until fledging approximately 120 days later, digiscoped photographs taken weekly at four nests of black Vultures, where the precise hatching date of the chick was known. On the basis of different stages of development of pulli, the age of chick was determined. Additionally, several hundred digital photographs, taken at the time of ringing of about 65 chicks of known age, have been used. The information used within this study was gathered during monitoring carried out at the Black Vulture colony at Rascafría (Madrid, Spain) in years 2004 and 2005 knowledge of breeding phenology of both pair and colony as a whole is important for their management and conservation (Puente et al., 2005).

In northern Spain, density and nest-site selection in the Egyptian Vulture was investigated. The breeding density is positively correlated with the availability of cliffs and independent of trophic resources and human activities. The positive or negative selection of a particular cliff for nesting seems to be determined by intraspecific competition (Ceballos et al., 1989).

Parker et al. (1995) suggested that Black Vultures, Coragyps atratus, spend each night in a communal roost, and individuals sleep at several different roosts over time. They feed in large aggregations at carcasses and engage in apparently cooperative behaviour within coalitions of individuals that co-occur predictably at both roosts and carcasses. Roost census data and DNA fingerprinting results were used to investigate whether Black Vultures tend to roost in the company of genetic relatives. A positive correlation emerged between indices of the genetic similarity of individuals and their tendency to use the same roost on the same night. The results provide evidence of long-term associations between some closely related breeding adults, associations that appear not to be simply a consequence of natal philopatry but reflect the daily reassembly of coalitions at communal roosting sites. This social organization could facilitate the evolutionary stability of cooperation among communally roosting black Vultures.

Avizanda et al. (2009) studied about nest predation of Bearded Vulture and suggested that the eggs were extracted, broken and eaten in the immediate vicinity of the nest and, when available, the structure of the nests was completely destroyed. On many occasions common Ravens predating on nests in this fashion. Lines with carcass presence showed higher predation rates (8–92%) than their respective paired lines where carcasses were absent (0–12%). The probability of nest predation increased with carcass availability and raven abundance but decreased with vegetation cover.

The Bearded Vulture, like most Raptors, is territorial and strongly defends its nesting space from potential competitors through aerial attacks (Bertran and Margalida, 2002). Aggressive interactions between Bearded Vultures and Common Ravens Corvus corax are relatively common; observations of several pairs in the Pyrenees revealed that 26% of the territorial attacks were directed against Ravens. Aggressive interactions

between both species have been reported in the areas where the two coexist (Margalida et al., 2001).

Territoriality frequently involves protecting offspring and food. Another risk of predation exposure for eggs and chicks can occur occasionally when certain factors i.e. Human disturbance, looking for and preparing food lead the birds to temporarily abandon their nests, and it was observed in other large Raptors. Aggressive encounters initiated by Ravens tended to be more frequent in the middle of the chick-rearing period. This coincides with the stage when the Bearded Vulture pairs are more active, moving around and preparing the remains in the ossuaries (Margalida and Bertran, 2001). The Raven is a species that exploits a great variety of food sources, which includes the soft parts attached to the bones of the carcasses (Hiraldo et al., 1991).

Ravens are agile flyers with strong talons, in this case the difference in size between Ravens and Bearded Vulture does not favour robbing food in flight. There was a high attack rate (75%) directed against Bearded Vultures in flight, more commonly when they entered or left their nests. Unlike other scavengers, the Bearded Vulture (depending on the size of the conspicuous shape) carries its prey in its talons or bill (Margalida and Bertran, 2000). Other species such as the Eurasian Griffon Vulture Gyps fulvus, which carries semi-digested food to the nest in its crop, have not been observed interacting with Ravens. This appears to indicate that Ravens carry out routine attacks when they notice the presence of potential hosts in the vicinity of the nests. One possible advantage of this behaviour is that Ravens, through harassment, can force the Bearded Vulture to land on the ground.

V. Reproductive Biology of Vulture

In Europe, Eurasian Griffon Vulture Gyps fulvus compete extensively with Lammergeier Vulture Gypaetus barbatus for nest sites (Bertran and Margalida, 2002). Evidence of inter specific aggression at nest sites also has been observed between Eurasian Griffon and Cinereous Vultures Aegypius monachus and between Eurasian Griffon and Egyptian Vultures Neophron percnopterus, and between Cinereous Vulture and Bearded Vultures (Aykurt and Kiraç, 2001). Nest-based inter specific aggression between Vulture species or between Vultures and other Raptors is frequently strong enough to have negative reproductive consequences (Matus, 2002). Lammergeiers are solitary breeders, often occupying nests high on cliffs in mountains or river valleys (Snow and Perrins 1998).Their nests are often, but not always, well-spaced from conspecifics and other Vultures. Himalayan Griffon is one of the world's least-known Vultures. Some reports suggest that they are not colonial breeders while others suggest that they are semi-colonial (Bertran and Margalida, 2002).

The study about Egyptian Vulture population trend between1988–2005, and the number of breeding pairs and reproductive performance were carried out in Castellon province of eastern Spain by Ripolles et al., 2006 and suggested that the number of breeding pairs increased from one pair in 1989 to 12 in 2005, probably due to the absence of poisoning and direct persecution in the Castellón province. From 2003–2005, 34 breeding attempts at 23 different breeding sites observed and mean chicks fledged per occupied territory was 0.91 ± 0.08, mean chicks fledged per successful pair was 1.20 ± 0.09, and mean breeding success was 0.76 ± 0.07 successful pairs per breeding pair in a tropical forest than it is for those same scavengers feeding in a coastal desert. In a tropical rain forest, competition for a dispersed, ephemeral resource may depend upon differential exploitation rather than interference.

The mean age of first breeding (egg-laying) in the captive population of Bearded Vultures was 7.7 years for females and 8.9 for males. The first offspring was raised on average by 8.3-year-old females and 9.7-year-old males. In wild Bearded Vultures, first-time-paired and territorial individuals were recorded when they were 6.5 years old, on average. The mean age of first breeding was 8.1 years, whereas the mean age of first successful breeding was 11.4. Paired females were recorded at the age of 6.5 years and breeding at 6, whereas the youngest recorded paired males were 6.4 years old and breeding at age of 7 year. Pyrenean Bearded Vultures are characterized by delayed reproduction, with the first breeding attempt taking place well after the acquisition of full adult plumage.

Gilbert et al., (2002) investigated the breeding success and pattern of mortality in two Vulture colonies Dholewala and Changa Manga area within Punjab Province, Pakistan between December 2002 and June 2000.Breeding success was found to be 62% in Dholewala and 59% in Changa Manga area. A total of 668 sick and dead Vultures were collected of which 591 were less than one month post mortem. No significant variation was found in the weekly mortality rate of adult and sub-adult Vultures during the study period spanning winter through summer. A peak in mortality rate was observed during late April and early May that corresponded to mortality of newly fledged juveniles. Minimum annual mortality rate in the adult breeding population was calculated to be 11.4% and 18.6%in Dholewala and Changa Manga respectively. In a subsample of dead Vultures (n = 185) visceral gout was found in 80%of adults, 63% of subadults, 19% of juveniles and, 13% of nestlings. These mortality rates were consistent with a rapid population decline. Results imply that the mortality factor responsible for the decline in Gyps Vultures described in India is also present in Pakistan and will potentially lead to a population decline of a comparable magnitude.

In birds laying a particular number of egg in generally believed to be in part genetically determined and consequently subject to natural selection, but in many species clutch size is known to be strongly influenced by ontogenic and environment factor. Species with variable clutch size most biologists would conclude that upper limit to clutch size is ultimately determined by natural selection. The clutch size of each species of birds has been adapted by natural selection to correspond with the larger number of young for which the parents can on an average provide food. Cody (1971) suggested that nine different factors known to influence the clutch size, age of parent, time of breeding food supply, population density, latitude, longitude, elevation, habitat and nest site.

Avian growth pattern are diverse and have evidently differentiated in response to a variety of social and environmental variable, including most prominently the mode of parental care and the predictability and the stability of food supply for the young. The intrinsic rate of post natal growth appears to have been maximized through selection, so that seasonal or geographical difference are absent or small except in obvious cases of malnutrition.

VI. Flight Development in Vulture

Donazari et al., (1996) stated that in Northern Spain the first flights of fledgling Egyptian Vultures Neophron percnopterus took place between at the age of 68-80 days. The post-fledging period ended when the young migrated (at the age of 89-113 days). The length of the post-fledging period was between 9-34 days and correlated negatively with the date of first flight. The number of flights carried out per day, the flight duration, the time spent flying, the time spent soaring and the size of the home range increased with age. Older fledglings in broods of two were more precocious and active in flight than their siblings. The young followed their parents during their visits to feeding places; this behavior is unusual among Raptors and may be related with maturation of social foraging strategies.

Information on the length of post-fledging and the development of behavioural patterns for old world Vulture is very limited. After attaining flight, young Vultures should be capable of searching for carcasses and feeding by themselves, rapidly becoming independent and there is prolonged parental care due to the need to obtain a scarce and unpredictable food resource

VII. Population Genetics of Vulture

Chromosome studies in 4 families of Falconiformes i.e. Cathartidae, Falconidae, Sagittariidae and Accipitridae showed that the karyological variety in this order is much wider than in any other avian order, which underlines the heterogeneous character of the group. Of the 4 families only the Cathartidae show karyological similarities with other avian groups (Gruiformes, Ciconiiformes), while the karyotypes of the Accipitridae are most uncommon among birds, because of the presence of only 8 microchromosomes (Boer, 2006).

Gautschi et al. (2003) suggested that captive population to be genetically more variable than the largest natural population in Europe, both in terms of mean number of alleles per locus and mean observed and expected heterozygosity. Allelic diversity of the captive population was higher and mean heterozygosity measurements were comparable with the ones found in two large, extinct populations from Sardinia and the Alps represented by museum specimens.

The amount of genetic variability were still high in the captive population of Bearded Vulture in the year 2000, mainly because the carriers of rare alleles were still alive. However, the decline in expected heterozygosity and the loss of alleles over generations in captivity was significant. Point estimates of effective population size, based on pedigree data and estimates of effective number of breeders, based on allele frequency changes, ranged from 20 to 30 % and were significantly smaller than the census size. The results demonstrate that the amount of genetic variability in the captive Bearded Vulture population is comparable or even larger than the amount present in natural populations. However, the population is in danger to lose genetic variability over time because of genetic drift. Management strategies should therefore aim at preserving genetic variability by minimising kinship, and at increasing effective population size by recruiting additional founders and enhancing gene flow between the released, the captive and natural populations.

Manuel et al., (2007) suggested that the toll-like receptor (TLR) family is an ancient pattern of recognition for Raptor family and conserved from insects to mammals. Members of the TLR family are vital to immune function through the sensing of pathogenic agents and initiation of an appropriate immune response. The toll-like receptors complementary DNA encoding for a Gyps fulvus is orthologue of mammalian TLR1 (CD281). The predicted 650 amino acid sequence comprised an extracellular domain with five leucine-rich repeats (LRR) and an LRR-C-terminal (LRR-CT) motif, followed by a 23 amino acid transmembrane segment, and a 190 amino acid intracytoplasmic region containing the Toll/IL-1R (TIR) domain.

Vulture TLR1 and TIR domain showed 64% and 86% amino acid sequence similarity with chicken sequences. The tissue and cell expression pattern of Vulture TLR1 were analysed by real time-PCR (RT-PCR) and correlated with the ability to respond to various pathogenic challenges. Despite the similarities in the overall structure and expression pattern of Vulture TLR1 with other vertebrate TLRs, the length of the Vulture TLR

ectodomain, number and position of LRRs and N-glycosylation sites suggest structural differences that may have functional implications.

Nanda et al. (2006) suggested that most of Acciriptids including Hawks, Eagles, Kites and old world Vulture (Falconiformes) show a sharp contrast to basic avain karyotype. Most of Acciriptids exhibit stingingly few micro-chromosome and appear to have been drastically restructured during evolution. Chromosome paints specific to the chicken(GGA)macro chromosomes 1-10 were hybridized to metaphase spreads of three species of Vultures (Gyps rueppelli, Gypaetus barbatus and Gyps fulvus).

Paints of GGA chromosomes 6-10 hybridize only to single chromosome or large chromosome segments, illustrating the existence of high chromosome homology. In contrast, paints of the large macrochromosome 1-5 show split hybridization signals on the chromosomes of the accipitrids, disclosing excessive chromosome rearrangements which is in clear contrast to the high degree of chromosome conservation substantiated from comparative chromosome painting in other birds. Furthermore, the GGA chromosome paints hybridization pattern reveal remarkable interchromosomal conservation among the two species Gyps rueppelli and Gypaetus barbatus of the genus Gyps.

VIII. Population Dynamics of Vulture

Satheesan and Shamshad, (2005) suggested that, Katerniaghat Wildlife Sanctuary in Uttar Pradesh continued to be paradise for wild life fauna. This protected area spread over 400 sq. km harbours the Tiger, One-horned Rhinoceros, Elephant, and Leopard in India and bordering Nepal, as well as Crocodile, Gharial, and the Gangetic Dolphin in the Gerua river. In this Forest Division in Bahraich District 28o 24'- 27o 4'N to 81 o 65'- 81 o 3'E covering 551.64 sq. km, 575 Vultures of five species (Long-billed and Eurasian Griffons, and White-backed, King, and Egyptian Vultures) and 31 nests of the Oriental White-backed Vulture Pseudogyps bengalensis were sighted in February 2002. But their actual population may be much more because of the proximity to Nepal and the Himalayas. The reduced population of White-backs observed here resembles similar trends in population decline observed during the rains elsewhere. Moreover, Vultures return to Katerniaghat to breed year after year, further confirmed by the vestiges of nesting materials detected on, and wing primaries found below Semal and Haldu trees. Factors responsible for Vulture decline here, including man-animal and animal-animal conflicts and other threats. Vultures here need immediate and total protection so that they can continue to "fire-wall" tigers on the prawl in sugarcane fields, crocodiles lurking in lotus ponds and other species against deadly pathogens and maintain the health of ecosystems network.

The current state of Griffon Vulture local population in the Gorge Uvac and its geographical position (located in northeast direction some 168 km far away) offer opportunities for spontaneous recolonisation of previously abandoned habitats in Herzegovina in Europe. This is supported by the fact that during winter months young birds from Serbia migrate through Herzegovina. On the other hand, during this phase of their life cycle, they are facing risk to be poisoned. Presented results could be used as a basis for planning protection and reintroduction of Griffon Vulture in Herzegovina. Successful protection and reintroduction achievements of Vulture species in Spain and France confirmed that it is possible to return these species on locations from which they have already vanished. By launching the Action Plan for Vulture protection in the Balkans, Bosnia and Herzegovina got the opportunity to be included in reintroduction programmes of endangered Vulture species. A long term study (1980-1991) has been performed, using census of nest and nesting couples. During this period, 61 nests, 83 nesting couples and 252 cases of nesting have been observed in four colonies of Griffon Vulture. During this period, 6 nests and 10 cases of nesting have been observed for the Egyptian Vulture. One pair of Bearded Vulture has been observed; however, the nest was not found (Marinkovic et al., 2005).

One of the most threatened bird species in Cyprus is the Griffon Vulture, which thirty years ago used to be a fairly common species on the island. The protection and conservation of rare Raptor species such as the Griffon Vulture can be significantly supported by artificial reproduction. Eggs normally are lost by parental neglect, predation, extreme environmental conditions, pathogen infection and other calamities. Vultures lay a second clutch to replace eggs that are removed for artificial incubation and through this achieved double reproduction since Vultures lay only one egg every year. For the conservation of the Griffon Vulture in Cyprus, many management measures and activities were implemented in order to contribute towards conserving the indigenous Vulture population. Among these measures, a cage with the proper specifications was constructed to encourage breeding in captivity in the cage. An attempt was made successfully in 2004 for artificial reproduction of a Vulture under laboratory conditions. The egg was removed from a pair in captivity and after it was incubated artificially it was placed in a nursery for a certain period and then in an artificial nest until the age of 4 months old. Then it was transferred back to the cage where its natural parents were found when it was ready to survive by itself without any human support (Iezekiel et al., 2005).

White-rumped Vulture Gyps bengalensis was once abundant in South-East Asia and in the Indian

subcontinent. Vultures have declined from many parts of their former ranges due to food shortages and loss of habitat (Pain et al., 2003). Eight species of Vultures have been recorded from Nepal, of which six are resident and two are migratory. White-rumped Vulture is reported up to 3100 meter, although it is most common up to about 1000 meter. In Nepal Koshi Tappu Wildlife Reserve (KTWR), Royal Suklaphanta Wildlife Reserve (RSWR) and the unprotected Rampur Valley are still strongholds for the species Gyps bengalensis.

Vulture population declines may have not noticed for many years simply because they were so abundant. The monitoring of colonies indicates that Gyps Vulture populations have been declining throughout their range in Nepal (Virani et al., 2001). Gyps bengalensis, once distributed throughout the lowlands of Nepal, now patchily distributed, being rarer in the east (Inskipp and Inskipp, 2001; Virani et al., 2001 and Baral and Gautam, 2002). During 2001–2002, 45 White-rumped Vultures were found dead in eastern Nepal, compared to only five in western Nepal (Virani et al., 2001). This suggests that mortality factors were less prevalent in the west or it may reflect lower survey effort in the east.

Baral et al., (2005) conducted a survey of the critically endangered White-Rumped Vulture Gyps bengalensis in lowland Nepal from October 2002 to May 2003. Direct observations were made at roosting and nesting sites to assess the population size, breeding success and nest-tree availability. A questionnaire survey was conducted to assess carcass disposal methods, threats from persecution and conservation attitudes. Six Vulture colonies were found, which supported 72–102 birds during the breeding season, and 123 birds following the breeding season. Breeding success at 70 occupied nests was 0.5 young per nest. Most nests were in kapok Bombax ceiba trees, and nesting habitat may be a limiting factor because these trees are logged for commercial purposes. A total of 33 dead Vultures was found, of which 30 were adults.

The carcasses of domestic livestock appear to be the main source of food for Vultures because there are few alternative wildlife prey species in the surrounding habitats. The abundance of carcasses observed suggests there is no shortage of food. Local people have favourable conservation attitudes, and their carcass disposal method is beneficial to Vultures.

IX. Seasonal Fluctuation in Vulture

Vultures show large level of seasonal fluctuation in their number to fulfill their requirement such as food availability, nesting and roosting site availability. Monitoring of bird population is often difficult as most species are territorial and sparsely distributed over sizeable area. Birds density exhibits local seasonal fluctuation and their activity may vary throughtout year. Usually Raptor censuses are restricted in breeding season when rapid changes in their detectibilty take place. In case of polonial and flocking Raptors census work is facilated by tracing the birds in localized area such as their colonies and communal roost.

The Vulture of genus Gyps are large gregarious species that breed colonially in cliffs, forming large nesting groups. Improved monitoring technique consist of counting birds at their breeding and roosting sites early in the morning and late in the evening before or after their foraging trips (Robertson and Boshchoff, 1986).

The behaviour of communal roosting is well documented among old and new world Vultures as well as in some flocking eagles. Seasonal fluctuations in roost size are typical for the migratory Egyptian Vulture Neophron percnopterus and for small cathartid Vultures (i.e. Cathartes aura, Coragyps atratus), which gather year round at persistent communal roosts. The temporal variation in the use of communal roosts is produced by different ecological pressures such as roost type, levels of human disturbance, climatic conditions and food availability. Some species are restricted to big dead trees which can support many birds and have easy access. While others select trees with thick foliage where favorable microclimatic conditions occur (Wright, 1986).

Xirouchakis (2007) suggested that morning and evening counts in Griffon Vulture Gyps fulvus colonies and communal roosts revealed that their numbers fluctuated by season and time of the day. In the colonies the Vultures built up high numbers during the pre-breeding and incubation periods (November–February) with maxima in December–January and dropped during the fledging and dependence periods (July–October) with minima in June–July. On the contrary griffons started to use communal roosts during the chick-rearing period (March June) while their numbers peaked when the young fledged (June–August). Daily use of colonies exhibited a bimodal pattern that was most pronounced in the pre-breeding period. Population size should be assessed by conducting morning counts starting at dawn in all active colonies and communal roosts during November–February.

X. Vulture and Human Interaction

Vulture is shy in nature and does not directly interact with human being but in indirect manner Vulture and human interact with each other. The traffic load near large cities may show dramatic cyclical changes induced by weekend tourism, and this could induce cyclical changes in the activity patterns of wildlife. Bautista et al., (2004) studied a 19-km-long section of a road that crossed a high-use Raptor area near a large city in Spain and observed 18 Raptor species along this segment of the road, including some threatened

species, such as the Spanish Imperial Eagle (Aquila adalberti). The number of cars increased dramatically on Saturdays and Sundays and assessed the effect of varying traffic loads on Raptor behavior by recording all birds of prey as close or distant to the road during working days and weekend days.

On weekends, the occurrence of Spanish Imperial Eagles and Vultures decreased near the road. The occurrence of other species did not change between working days and weekend days. The activity decrease on weekends by Imperial Eagles and other large Raptors suggests that there are weekly cycles in Raptor activity and these weekly cycles in wildlife caused by human.

Arroyo et al. (2006) evaluated the effect of human activities on the behaviour and breeding success of Bearded Vultures breeding in the French Pyrenees. Human activities influenced Bearded Vulture behaviour (primarily through a decrease in nest attendance), but this effect varied in relation to the type of activities and the distance to the nest. Very noisy activities and hunting most frequently provoked nest unattendance even when occurring far (>1.5 km) from the nest. People on foot or cars and planes only affected Bearded Vulture behaviour if close (<500–700 meter) to the nest and also find a significant relationship between human activities and Vulture breeding success. The probability of failure increased with the frequency of human activities. There was a significant relationship between the probability of failure and the frequency of very noisy activities.

Houston (2008) states that Carcasses were provided at a gallery forest site in Venezuela to compare the feeding methods of four different Vulture species. Turkey Vultures or Lesser Yellow-headed Vultures were always the first species to arrive. Black Vultures were most likely to arrive at large carcasses or those in open situations and were the only species to form large feeding groups. King Vultures were equally likely to arrive at small or large carcasses. There were marked differences in feeding technique, food selection, rate of feeding and bill morphology between Turkey, Black and King Vultures, and the level of aggression between species was low compared to intra-specific aggression.

XI. Vulture Conservation Programme

Surveys on the population status of Vultures suggested that in the last decade there has been drastic crash in Vulture population observed. To save its population it is necessary to run various Vulture conservation programmes. Piper (2006) stated that, three forms of supplementary feeding schemes have been used in Vulture conservation; pure supplementary feeding, predator simulation and Vulture restaurants. Supplementary food will only contribute to the conservation of a species if food is the crucial limiting factor. If the population is limited by poison then the provision of clean food will only contribute if it can be ensured that the Vultures will not consume any poisoned food. In some cases, if the poison is lethal, diffused throughout the carcass and not biodegradable (in either the carcass or the Vulture) then there need only be one poisoned carcass in about 250 for the entire population to be extirpated.

The provision of supplementary food must be accompanied by a well though out action plan that simultaneously deals with the other important population threats. Supplementary feeding programmes must be implemented with a careful understanding of the demography of the species and its social structure. For instance, the regular provision of small quantities of food at a few fixed sites in the Negev Desert was of greater benefit to adult birds while the provision, randomly in space and time, of a few large carcasses was of much greater benefit to immature and subdominant individuals.

Conservation actions and reintroduction programmes have been carried out to restore viable populations of Griffon Vulture in the South of France. Demographic and genetic studies were run to assess and understand the success of these programmes. By using micro-satellite markers, investigated genetic diversity and structure of three native colonies that were spatially fragmented around the Mediterranean basin. Assessment of the genetic characteristics of four founder groups of reintroduction programs, and two settled reintroduced colonies in France were carried out and found that all studied populations of Griffon Vulture form only one genetically diverse unit, in which restricted gene flows between some colonies could lead to genetic differentiation. All Griffon Vulture colonies should be managed as one unit, optimising connections between them and random sampling of individuals among remnant populations of Griffon Vultures permits us to constitute highly diverse founding groups. Genetic diversity is preserved in the reintroduced colonies, probably because of high immigration rates of Pyrenean or Spanish individuals. Vulture genetic diversity reintroduction has been a success from the genetic point of view.

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Modelling Water-Sanitation Relationship in Edo State, Nigeria

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Abstract- An effective understanding of water and sanitation supply in developing states such as Edo-state is a veritable tool in addressing uneven distribution of these utilities. This research study focuses on the evaluation of water and sanitation supply in the state using baseline and demand responsiveness approaches to capture data on water and sanitation supplies in all the 18 local government areas in the State. Variables such as coverage of access or no access to water and sanitation supply, sources of water and incidences of water-related diseases were captured and technically analysed. The output of the analysis revealed that 62% representing 1,346, 649, population could not access portable water, while 38% corresponding to 813,199 could fairly access portable water in 1993. However, coverage for safe drinking water between 1993 and 2002 in Edo-State is not significant at 95% confidence interval. In addition, 72% (2,009,566 population) did not have any access to sanitation; while 28% (777,210 population) had fair supply of sanitation. The regions with poor sanitation and water index are Etsako central, Etsako west, Esan west, Esan north-west, while Oredo, Akoko- Edo, Egor and Owan east have improved sanitation and water index. The results obtained also indicate widespread of water and sanitation related diseased in the State with the recorded highest cases of Schistosomaisis (134, 361:43%); Typhoid (81,981:27%); Cholera(62,191:20%) and Diarrhea (29,893:10%) respectively.

Keywords: *access water, sanitation, population, index, disease, portable water, demand, supply, coverage.*

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Keywords: access water, sanitation, population, index, disease, portable water, demand, supply, coverage.

I. Introduction

Water is a natural resource of fundamental importance. It supports all forms of life and creates jobs and wealth in the water sector, tourism, recreation, fisheries (Ntengwe, 2005). However, water resources, like other natural resources are limited in supply. Without water life is as it exist on our planet is impossible (Olotu et al., 2009). 97.5% of water on the earth is salt water living only 2.5% as fresh water of which over two thirds is frozen in glaciers and polar ice caps. Water forms the largest part of most living matter. The number of people who rely on the earth's limited freshwater reserves is increasing everyday. In fact, a scarcity of clean, fresh water is one of the world's most pressing environmental problems (Arms, 2008). Water demand already exceeds supply in many parts of the world, and as world population continues to rise at an unprecedented rate, many more areas are expected to experience this imbalance in the near future (Waterkeyn, 2003).

Sanitation is the safe management of human excreta and includes both hardware (sanitation technologies, such as toilets and hygienic latrines) and 'software' (hygienic promotion, such as hand washing). Over the past several years, the international community has agreed to a number of water-and sanitations-related goals, including halving, by 2015, the proportion of people unable to reach or afford safe drinking water and the proportion of people without access to basic sanitation (Starkl, 2003). While, globally, the world is on track to meet the target on drinking water, specific regions lag significantly behind, chiefly sub-Saharan African, and especially in rural areas. Water Assessment Program, by 2050, 7 billion people in 60 countries may have to cope with water scarcity (Chenoweth, 2008). Progress on the sanitation goals is much further behind; little progress has been made almost anywhere in the developing world. At current rate of progress, sub-Saharan Africa will not meet the millennium development goals sanitation target until 2076 (Sullivan, 2001).

In Edo State and other Niger-Delta states of Nigeria are facing a great challenge towards the accessibility of safe drinking water and sanitation. This development has resulted to reduction in production and increase in a number of water and sanitation related diseases such as cholera, diarrhoea and typhoid across the state. Without accurate data we cannot have sustainable water and sanitation supply. Having considered the challenges brought by these problems, the research study is focused at evaluating the supply of water and sanitation wants and formulates holistic strategies of ensuring sufficient supply.

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II. Materials and Methods

a) Description of study area

Edo state region of Nigeria is among the deltas in the world. It constitutes the coastline area of Nigeria. It is bounded in the south by delta state in the West by Ondo state in the North and North East by Kogi state and in the East by Anambra state. Edo State covers an area of 19,744km2 and has a total population of 2,159,848 and population density of 109 (based on the 1991 census figure). The state has approximately between latitude 05o 44'N and 07o 34'N of the Equator and between latitude 06o 04o'E and 06o 43o'E. Edo State has annual mean rainfall of above 2,000mm, air temperature of 27oc and relative humidity of above 80%. Fig.1 shows the photograph map of Edo State indicating the study areas. Reconnaissance survey using baseline data extracting mechanism was applied to obtain information in all the visited of local government areas in Edo-State. Four places were visited in each local government area; comprising two rural and two urban settlements. A total of 72 villages and towns were visited in Edo state. In addition, Ministry of Water, Finance and Environment were visited.

Fig 1: Map of Edo-State showing the regions of study

A total of 600 technically designed questionnaires were constructively administered to all the sampled places in the state. Out of the numbers that were administered, 550 completed questionnaires were retrieved (representing 92 percent). The questionnaires were structured to capture the following water and sanitation components:

1. population access to safe drinking water;
2. sanitation coverage;
3. coverage access to safe drinking water;
4. incidences of water and sanitation related diseases;
5. social sector expenditure; and
6. sources of water. Retrieved questionnaires were well collated, sorted and subjected to statistical analysis using tools such as One-Sample Statistics, One-Sample-Test or T-TEST and some other statistical measures.

These analyses were carried out to determine the degree of population coverage to sanitation and safe drinking water, the relationship between coverage to water- sanitation and incidences of diseases such as cholera, diarrhoea, typhoid, cholera and schistosomiasis and the justification of the expenditure on the sector (water and sanitation) to the physical accessible projects in Edo state.

III. Results and Discussion

a) Coverage of safe drinking water

A survey of access to safe water and sanitation in 72 towns and cities in Edo state revealed that 38% of the population had access to safe water either from the borehole, pipe borne water and well constructed hand dug wells. However, 62% corresponding to 1,346,649 could not access portable water as shown in Table 1 and fig. 1 respectively. In addition, places like Etsako West and Etsako Central, are the most water stressed region, while Oredo, Owan West and East have fairly supply of potable water to their teeming population. This shows that the people at the urban areas could access safe drinking than the rural dwellers.

Table 1 : Population access to safe drinking water in Edo State

S/N	Local Govt.	Population	Indicator	Asw	Nasw	%Asw	%Nasw
1	AKOKO EDO	124,366	0.39	48,503	75,863	39	61
2	ESAN CENTRAL	66,169	0.31	20,512	45,657	31	69
3	IGUEBEN	62,342	0.32	19,949	42,393	32	68
4	ESAN SOUTH-EAST	88,358	0.34	30,042	58,316	34	66
5	ESAN NORTH-EAST	89,486	0.31	27,741	61,745	31	69
6	ESAN WEST	91,748	0.30	27,524	64,224	30	70
7	ETSAKO EAST	143,903	0.28	40,293	103,610	28	72
8	ETSAKO CENTRAL	43,263	0.27	11,681	31,582	27	73
9	ETSAKO WEST	87,663	0.27	23,669	63,994	27	73
10	OREDO	305,230	0.48	146,510	158,720	48	52
11	EGOR	212,485	0.42	89,244	123,241	42	58
12	IKPOBA OKHA	263,261	0.45	118,467	144,794	45	55

13	OVIA NORTH-EAST	122,107	O.40	48,843	73,264	40	60
14	OVIA SOUTH-WEST	81,020	0.41	33,218	47,802	41	59
15	OWAN EAST	78,136	0.37	28,910	49,226	47	63
16	OWAN WEST	72,963	0.37	26,996	45,967	47	63
17	ORHIONMWON	118,054	0.30	35,416	82,638	30	70
18	UHUNWODE	109,294	0.31	33,881	75,413	31	69
	Total	2,159,848		813,199	1,346,649		

Source : Field study

Note:

Asw: Access to safe water

Nasw: No access to safe water

% Asw: % access to safe water

%Nasw: % No access to safe water

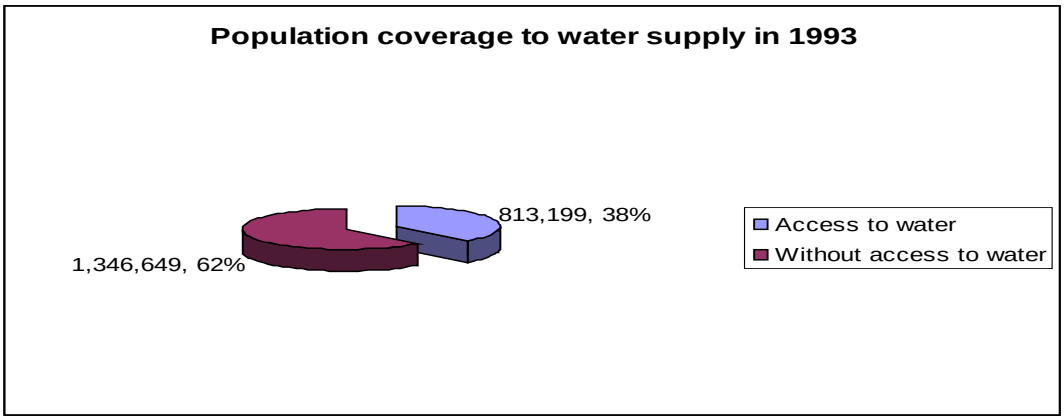

Fig. 1 : Population coverage to water supply

The result in Table 2 further shows the distribution of safe water coverage in Edo-state. The people with access to improved source of drinking water in 1993 were 813,199 out of 2,159,848 representing 38% of the total population as it shown in Fig.1. In 2002, the population with access were 1,268,607 out of 3,485,283 people representing 36.3% of the total population. Finding using T-test revealed that the distribution of portable water in Edo-State between 1993 to 2002 is not significant at 95% confidence interval as it is shown in Table 4. The calculated T-test values were 20.7 and 13.3, while the T-critical values at 95% confidence interval are 1080.16 and 3071.6 respectively. However, the population without access to water has not been improved. In 1993, 62.7% of the population could not access safe drinking water and 63.7% of the population could not in 2002. This result shows that there is no meaningful coverage of safe drinking water between 1993 and 2002 in Edo State.

Table 2 : Coverage access to safe drinking water in Edo State (1993-2002)

S/N	Year	Access to safe water	No access to safe water	Total population
1	1993	813,199	1,346,649	2,159,848
2	1994	883,299	1,597,081	2,480,380
3	1995	986,595	2,077,304	3,063,899
4	1996	1,046,756	2,092,307	3,139,063
5	1997	1,096,956	2,110,632	3,207,588
6	1998	1,141,318	2,138,780	3,280,098
7	1999	1,188,316	2,168,994	3,357,310
8	2000	1,226,966	2,195,178	3,422,144
9	2001	1,256,267	2,206,432	3,456,699
10	2002	1,268,607	2,216,676	3,485,283
	Average Total	1,027,827.9	2,015,033	3,105,231.2

Source : Field study

Table 3 : One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Year	10	1997.5000	3.02765	.95743
Access to water	10	1080.1600	165.01502	52.18233
Total population	10	3071.6000	502.78694	158.99519

Table 4 : One-Sample Test

	Test Value = 0					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
	Lower	Upper	Lower	Upper	Lower	Upper
Year	2086.321	9	.000	1997.50000	1995.3341	1999.6659
Access to water	20.700	9	.000	1080.16000	962.1154	1198.2046
Total population	19.319	9	.000	3071.60000	2711.9279	3431.2721

b) Sanitation supply and coverage

2.5 billion People lack access to improved sanitation, including 1.2 billion people who have no facilities at all (Olotu et al., 2009). This observation corresponds to the output of the research study carried out in Edo-State as shown in Table 5. In 1993, a total of 715,377(33.3%) had access to sanitation, while the remaining population of 1,444,471(66.7%) could not access a comprehensive sanitation. The towns with poor sanitation index are Etsako central, Etsako West, Esan West, Esan North-East, while places like Oredo, Akoko-Edo, Egor, Ikpoba, Okha and Owan-East experience fairly distribution of sanitation supply. The situation in the state is worse because more population did not have access to safe excreta disposal facilities and more than 83% use pit latrines. Both solid and waste water are freely discharged to the environment without considering its adverse effect or health consequences. The result in Table 6 shows total coverage of sanitation in Edo-state for ten years. 72% of the population could not have access to good sanitation, while only 28% had access to good sanitation as shown in Fig 2. This shows that the Edo-state is off track of meeting MDG targets of 75% of population with improved water and 63% of improved sanitation facilities by year 2015.

Table 5 : Sanitation coverage in all Local Government Areas in Edo State in 1993

S/N	Local Govt.	Population	Indicator	Ass	Nss	%Ass	% Was
1	AKOKO EDO	124,366	0.35	43,528	80,838	35	65
2	ESAN CENTRAL	66,169	0.36	17,204	48,965	26	74
3	IGUEBEN	62,342	0.27	16,832	45,510	27	73
4	ESAN SOUTH-EAST	88,358	0.28	1.24,740	63,618	28	72
5	ESAN NORTH-EAST	89,486	0.28	25,056	64,430	28	72
6	ESAN WEST	91,748	0.26	23,854	67,894	26	74
7	ETSAKO EAST	143,903	0.32	46,049	97,854	32	68
8	ETSAKO CENTRAL	43,263	0.23	9,950	33,313	23	77
9	ETSAKO WEST	87,663	0.24	21,039	66,624	24	76
10	OREDO	305,230	0.41	125,144	180,087	41	59
11	EGOR	212,485	0.38	80,744	131,741	38	62
12	IKPOBA OKHA	263,261	0.40	105,304	157,957	40	60
13	OVIA NORTH-EAST	122,107	O.35	42,737	79,390	35	65

14	OVIA SOUTH-WEST	81,020	0.34	27,547	5373	34	66
15	OWAN EAST	78,136	0.38	29,692	48,444	38	62
16	OWAN WEST	72,963	0.25	18,241	54,722	25	75
17	ORHIONMWON	118,054	0.25	29,512	88,541	25	75
18	UHUNWODE	109,294	0.26	28,416	80,878	26	74
	Total	**2,159,848**		**715,377**	**1,444,471**		

Source : Field study

Note:

Ass: Access to sanitation
Nss: No access to sanitation
%Ass: % Access to sanitation
%Was: % Without access to sanitation

Table 6 : Population coverage for sanitation in Edo state (1993-2002)

S/N	Year	Access to sanitation	No access to sanitation	Total population
1	1993	715,377	1,444,471	2,159,848
2	1994	740,377	1,644,481	2,384,858
3	1995	755,497	1,779,694	2,535,191
4	1996	767,823	1,905,205	2,673,028
5	1997	779,666	2,005,439	2,785,105
6	1998	787,167	2,111,619	2,898,786
7	1999	796,800	2,206,628	3,003,428
8	2000	809,278	2,290,064	3,099,342
9	2001	816,797	2,343,371	3,160,168
10	2002	823,321	2,364,687	3,188,008
	Average total	**777,210**	**2,009,566**	**2,788,776**

Source : Field study

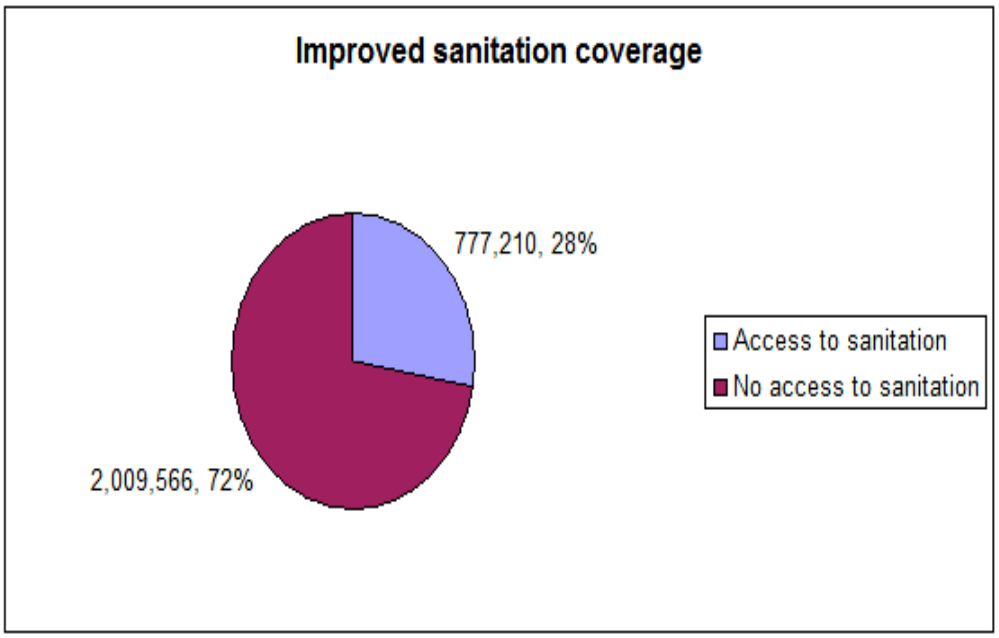

Fig. 2 : Improved sanitation coverage

c) Incidence of water and sanitation diseases

At any given time, half of the world's hospital beds are occupied with patients suffering from diseases associated with lack of access to safe drinking water, inadequate sanitation and poor hygiene (Blum and Feachem, 1983). The result in Table 7 shows the summary of water and sanitation related diseases in Edo-State between 1993 and 2002. Highest cases of Schistosomaisis of 134,361 representing 43%, followed by Typhoid (81,981: 27%), Cholera (62,191: 20%) and

Diarrhea (29,893: 10%) respectively as indicted in figure 3. These diseases endemic throughout Edo State are generally associated with unsatisfactory sanitation conditions and inadequate health education programmes in the State. Health implications of water supply deficiencies in Edo-state are enormous.

Table 7 : Incidences of water and sanitation related diseases in Edo state

S/N	Year	Diarrhea	Typhoid	Cholera	Schistosomiasis
1	1993	3,672	10,351	7,334	15,961
2	1994	3,491	9,806	7,181	15,314
3	1995	3,209	9,243	6,833	14,863
4	1996	3,097	8,821	6,516	14,412
5	1997	2,986	8,417	6,209	13,911
6	1998	2,856	7,972	6074	13,206
7	1999	2,742	7,511	5,896	12,845
8	2000	2,695	7,045	5,618	12,063
9	2001	2,604	6,683	5,349	11,434
10	2002	2,561	6,132	5,181	10,352

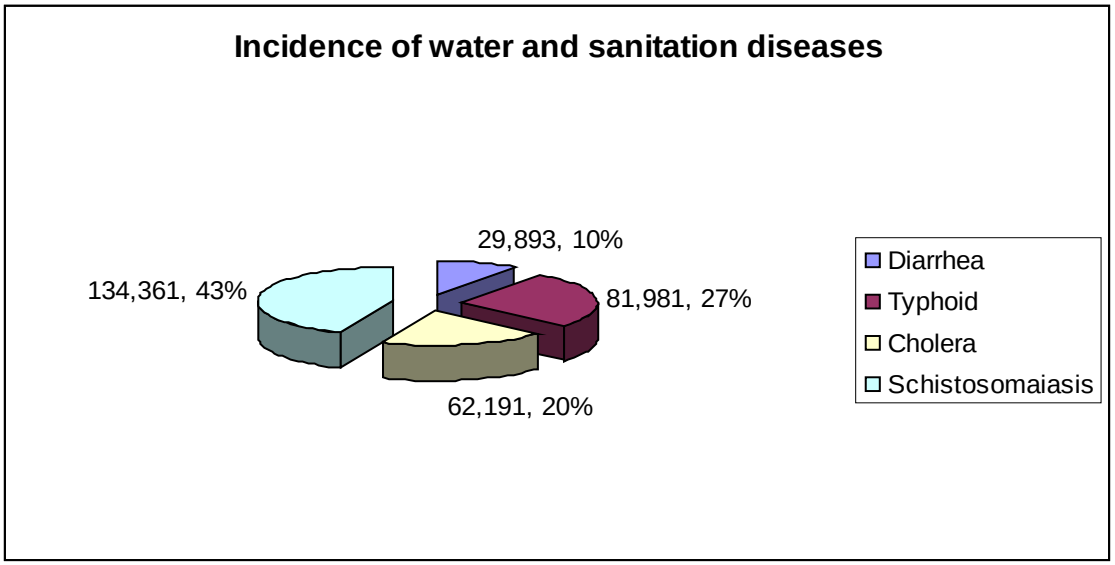

Fig. 3 : Incidence of water and sanitation diseases

The population of people with access to safe drinking water and needed sanitation in the state is low, the state is relatively densely populated and the direct health hazard it imposes is always underestimated. The outbreak of these diseases could be prevented by improving water, sanitation, hygiene and management of water resources. Such improvement reduces child mortality and improves health and nutritional status in a sustainable way.

d) Sources of water

Wide disparities in access to improved sources of drinking water exist among the visited local government areas in Edo-state. The findings reveal that water scarcity is very critical in the following regions: Etsako West, Etsako Central and Esan North East in the month of February to April and the scarcity reduces during the wet season. This is primarily because these regions depend solely on rain harvesting for the major source of their water supply. In addition, the finding indicated that 69.8% of the population has access to rain harvesting in Etsako West, 65.5% in Etsako Central, 5.9% in Oredo and 4.3% in Akoko Edo respectively. Due to the contamination of harvested rain water, it is regarded unsafe for drinking without adequate treatment.

Table 8 : Sources of water distribution (%)

S/N	Local Govt. Area	Rain water harvesting	Pipe borne water	Bore hole
1	Akoko Edo	4.3	5.2	6.0
2	Oredo	5.9	54.2	19.9
3	Etsako West	69.8	3.7	6.0
4	Etsako Central	65.5	3.8	5.3
5	Esan North East	65.6	4.2	4.8

Source : Field study

In Etsako West about 6% had access to water from protected boreholes, 4.8% in Esan North East, 5.3% in Etsako Central, 6.0% in Akoko Edo and 19.9% in Oredo, while 54.2% used water from pipe borne water in Oredo 5.2% in Akoko Edo, 3.8% in Etsako Central, 4.2% in Esan North West and 6% in Etsako West respectively. From this result, it shows that Oredo has fairly distribution of safe drinking water in Edo state.

e) Social expenditure

Table 9 presents summary of expenditure for social institutions in Edo state in 2002. This table shows that highest expenditure of 582,189 million naira representing 37% was expended on health, followed by education with 330,132 million; 21.1% and the least capital was expended on water and sanitation value, 290,107 million naira; 18.4%. Having considered the variation on the general expenditure in Edo state, it clearly shows that water and sanitation sector has completely been neglected. This development brings about poor awareness in the area of water, sanitation and hygiene, development of existing dams or reservoir, water point and boreholes. Holistic integration of all these lapses resulted in the epidemic of water and sanitation related diseases such as cholera, diarrhea etc. across state as indicated in Table 7.

Table 9 : Social sector expenditure in Edo-State in 2002

S/N	Social Sector	Expenditure(millions)	Share of Expenditure (%)
1	Education	370,148	23.5
2	Health	582,189	37.0
3	Security	330,132	21.1
4	Sanitation and Water	290,107	18.4

Source : Field study

IV. Conclusions

The role of water and sanitation in modern society such as Edo state can never be under estimated. Water resources problems have the potential to constrain human well being, economic development, food security and healthy ecosystem. This research study evaluated the supply of water and sanitation in Edo State. It was deduced from the findings that Edo State is off the tract of meeting Millennium Development Goal (MDG) of 75% coverage for access to safe water and 63% for sanitation supplies by the year 2015. It has been observed that better access to potable water and sanitation can drastically reduce the total burden of diseases and improvement in public health cares.

Effective strategies require a particular participatory approach and this takes good marketing in the areas of water and sanitation development. Sanitation is perceived as personal and not important as a utility like water is. This thinking must completely be changed. Generally, Edo State Government should prioritize safe water and sanitation supplies in their budgetary allocation in order to increase the degree its coverage in the state.

V. Recommendations

Based on the findings, the following recommendations are drawn:

1. Bottom up approach mechanism must be introduced in designing and developing water and sanitation programmes;
2. Demand responsiveness approach must be introduced in establishing water and sanitation project in any of the local government areas in Edo State;
3. Government, both local and state in Edo state should match their political will with financial commitment to see that the allocation for water and sanitation sector is increased, and ensured that voted capital is appropriately spent/applied in the provision of water point, sanitation facilities such as public latrines, hygienic awareness programme/ education;
4. Community based effort must be introduced so that the people in the community see any of the water and sanitation project in their domain as theirs towards protecting and maintaining them; and

5. Corporate organizations, international organizations and some private individuals should be encouraged to invest in water and sanitation sector in order to compliment governmental efforts.

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Community Capacity Building and Crime Reporting in Lagos, Nigeria

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Abstract- Various reasons cause community residents not to report crimes to the police. This study examined the capacity to report crimes among residents of communities in Lagos, Nigeria within the functionalist framework. A combination of qualitative and quantitative approaches was adopted. The study was conducted in the three senatorial districts of Lagos. Data collection involved a survey of 948 respondents selected though a multistage sampling procedure, 6 In-Depth Interviews, 12 Key Informant Interviews and 10 Case Studies were conducted to elicit qualitative data. While quantitative data analysis involved the use of descriptive statistical tools, chi square and regression, qualitative data were content analysed. Findings show that 50.6% of respondents had no capacity to report crime due to ignorance and 48.2% because of pressures from social networks. Moreover, while 1.6% of respondents were less constrained to report crime to the police because they suspected the police, 33.2% were scared by police demand for bribes. The study concluded that victims were unaware that their relative safety depends on their ability to put local intelligence behind the police in solving crime. It recommends that government should criminalize stereotypes against reporting and include reporting capacity building norms in schools'curricula right from primary to tertiary levels.

Keywords: community capacity building, crime reporting, local intelligence, stereotypes, victims.

GJSFR-E Classification : FOR Code: 170113, 160201

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Keywords: *community capacity building, crime reporting, local intelligence, stereotypes, victims.*
Word Count: 200

I. Introduction

Many communities especially in developing countries are poorly equipped to respond to existing and emerging crime reporting demands. They lack the institutional framework, determination, financial, procedural and information resources to overcome the perceived hazards and risks inherent in crime reporting. Therefore, people and their social institutions must be included in the community planning process to increase the probability of achieving a successful outcome (Serageldin, 1994) in such an all important enterprise. The axiomatic argument behind this emphasis is that, for these programs to be effective, the people for which a program is intended should have a voice in the design and implementation of these interventions, as people's participation depends on what they consider meaningful and relevant in the context of their visions, experiences, and values (Jackson et al., 2003; Minkler & Wallerstein, 2007; Smith, Littlejohns, Hawe, & Sutherland, 2008). We define community as an orientation for action, as the research dynamic was intended to be a facilitating process to foster assets, resources, and networking possibilities (Simpson et al., 2003; Smith et al., 2008; Walter, 2007). Thus, Chaskin (2001:295) sees community capacity building "as the interaction of human capital, organizational resources, and social capital existing within a given community that can be leveraged to solve collective problems, and improve or maintain the well being of that community".

In the process of capacity building, networks which are capable of providing "an infrastructure for collective action and act as visible proponents of group claims to help shape public discourse and debate" (Minkoff, 1997:614) emerge. To be productive, the UNDP outlines that capacity building takes place at three levels: First, at individual level, community capacity-building requires the development of conditions that allow individual participants to build and enhance existing knowledge and skills. It also calls for the establishment of conditions that will allow individuals to engage in the "process of learning and adapting to change. Second, at institutional level, community capacity building should involve aiding pre-existing institutions in developing countries. It should not involve creating new institutions, rather modernizing existing institutions and supporting them in forming sound policies, organizational structures, and effective methods of management and revenue control. Finally, at societal level, community capacity building should support the establishment of a more "interactive public administration that learns equally from its actions and from feedback it receives from the population at large." Community capacity building must be used to develop public administrators that are responsive and accountable (United Nations Committee of Experts on Public Administration, 2006).

Some scholars have challenged the use of the community capacity building approach in research and intervention, highlighting the contested aspects of community and community capacity building (Craig, 2007; Diamond, 2004; Mowbray, 2005; Simpson, Wood, & Daws, 2003; Williams, 2004). However, if any new influences will modernize pre - existing crime reporting values, skills and norms as well as refine the people's pre - existing institutions to develop sounder policies and effective method of management without losing sight of the need to embrace more interactive public administration, they must be people focused and driven.

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It is for the foregoing logic that capacity building activities in the context of response to crime are commonly geared towards strengthening community authorities, norms and values. This is often intended to ensure the proper handling of crime prevention and control issues, the care of victims, the promotion of their self-reliance and the recognition of durable solutions to their traumatic challenges in the aftermath of victimisation. It is probably for the foregoing reasons that Amherst Wilder Foundation (2000) concluded that capacity building must rest on the notion that change is the norm and not a passing anomaly. The task of salvaging victims of crime cannot be accomplished by individuals alone. It requires a partnership framework involving community institutions and broader societal inputs, together with crime victims themselves. This is more so because the benefits of efforts to promote crime reporting to law enforcement are numerous and can provide police and lawmakers with accurate information for policy decisions (Kruttschnitt & Carbone-Lopez, 2009; Gartner & Macmillan, 1995)

If crime victims are acutely vulnerable to further victimization (Farrell, 1995; Pease & Laycock, 1996), non victims may achieve nothing concrete by rolling out the drums. It may just be a question of time and place for their own moments of misfortune to come. It is only by the instrumentality of community capacity building that a powerful army of crime reporters can be raised to make threatened communities liveable for vulnerable citizens. Remarkable as community capacity building initiative appears, it is open to diverse abuses. For example, one of its criticisms is that projects that promote "capacity" and "self-sufficiency" in the communities may be guises through which governments minimize their account-ability for larger social ills. Furthermore, community capacity building projects may act as a means to boost the reputations of politicians and government officials, playing upon the well intentioned connotations that surround the concepts of community, community capacity, and social capital (Mowbray, 2005). As a consequence, this diverts attention from the larger causes of socioeconomic disparities to the responsibility of the individuals living in lower income communities, thereby placing blame on the victim and focusing on "defective" populations (Craig, 2007; Mowbray, 2005; Williams, 2004).

The study adopted structural functionalism as its theoretical framework. This is a theory which essentially looks at society through the lenses of macro-level social structure and social functions that focus broadly on the society as a whole. A structural functionalist approach emphasizes social solidarity which gains different forms of expression in organic and mechanical environments, as well as stability in social structures. The pioneer structural functionalists such as Saint Simon, Comte, Parsons and others started their sociological investigations using the instrumentality of functionalism since the mid-1800's, the scientific status of the perspective did not enjoy universal acceptance until late nineteenth century when Durkheim mains-treamed sociology by empirically demonstrating its scientific significance with his study of suicide. Crime reporting is functional for an ordered society while the reverse is dysfunctional because it conceals the 'dark figures' of unreported criminal activities in communities. To the extent that crime reporting provides clearly defined clues to the apprehension of criminals, enrich crime statistics, keeps victims from being re-victimised and thus controls crime; community capacity building efforts, in the context of crime reporting, are functional for the collective safety of community dwellers.

There is no doubt that strong relationship exists between and among individual, family, group, organization and community development (Amherst Wilder Foundation, 2000) to make community capacity building efforts rely solely on people and their different levels and contents of interactions a sensible target. The fact that capacity-building strategies typically do not work well if they come from the "one-size-fits-all" realm that lacks the beauty of diverse values, assumptions, and intervention methods that characterise the community driven option underlies this study. The urgency of capacity building is significant because the scale of need for crime reporting is enormous, especially against the background of women remaining the dominant victim of domestic violence in Nigeria. There is no doubt also that violence against women in particular is inherently linked to gender roles, gender stereotypes, notions of masculinity and patriarchal values (Vetten, 2000) which have deprived them of the desirable skills and confidence to report their victimisation in most developing societies of the world. The appreciation of this culture of poor reporting among community residents appears rather too low for comfort. It is against this backdrop that the study asked the following questions: (i). why are crime victims not reporting all their victimisation experiences to the police? (ii). Could this unwillingness issue from victims' incapa-city to report crimes? (iii). How can the capacity of community residents for crime reporting be significantly improved?

II. Data and Methods

The study was conducted in Lagos State, in the South-West Geopolitical zone of Nigeria. The 2006 National Census puts the population figure of Lagos at 9,013,534 (Official Gazette, 2006). The presence of well protected and largely unprotected citizens in Lagos has potentials for crime commission, victimisation and crime reporting responses. Therefore, the fact that this study investigated the nexus between crime location and victims' reporting practices makes Lagos the right location for the inquiry. The study is based on two

categories of data, namely, the quantitative and qualitative data. While the survey method serves as the main source of primary quantitative data, a sample survey was conducted between September and November 2012 to elicit quantitative data from 948 respondents through a multi-stage sampling procedure. First, the study adopted the categorisation of Lagos State into three Senatorial Districts: Lagos Central Senatorial District, Lagos East Senatorial District and Lagos West Senatorial District by The National Population Commission (2006). Second, based on the findings of Soyombo (2009) and Alemika (2009) in respect of areas recognised as the "black spots" of crime in Lagos state as listed by the police, through simple random process the study selected Mushin, Lagos Island and Ibeju Lekki Local Government Areas from Lagos West, Lagos Island and Lagos East Local Government Areas in that order where Lagos Central, Lagos West and Lagos East Senatorial Districts represented urban, semi urban and rural communities of Lagos respectively.

Third, at this stage, the study adopted the 245 wards created by the Federal Government as its sample frame. Therefore, all the 19 wards in Mushin Local Government Area were included, 10 wards were randomly selected from those in Lagos Island Local Government Area and 5 wards were randomly selected from those in Ibeju Lekki Local Government Area in accordance with the proportion of their different population sizes. Fourth, in all the 13 political wards at Mushin Local Government, the study randomly selected 2 streets from which 20 houses were then randomly selected. Also at Lagos Island Local Government, the study selected 2 streets from each of the 8 selected political wards. From each of these selected streets, 20 houses were randomly selected. Finally, at Ibeju Lekki Local Government, the study selected 2 communities from each of the 5 selected political wards. Using the criteria of the NPC assigned house numbers; the study randomly identified and selected 20 houses from each of the two selected communities. (Ibeju Lekki Local Government Area under the Lagos East Senatorial District is uniquely rural). It does not have clearly designated streets. Therefore, the study opted for communities because they are more clearly recognised than streets. Overall, from each of these 42 streets and 10 communities, 20 houses were selected. Finally, one household was randomly selected from each of the selected houses. However, in a case where more than one household occupied a house; lottery method (yes/no) was used to select the respondent interviewed in such a situation. Copies of a questionnaire were administered on each of the 1040 household heads.

For qualitative data, In-depth interviews were conducted with 3 traditional rulers and 3 religious leaders selected equally from each of the three Senatorial Districts. Twelve key-informant interviews were also conducted 3 Divisional Crime Police Officers, 3 Chairmen of Landlord Associations and 6 Members of Victims' Family to elicit key crime reporting issues to validate and expand the researcher's understanding of crime reporting practices of the people. Ten case studies were conducted with victims of very serious violent crimes that were identified from the survey respondents to capture victims' losses, trauma, worries, intervention programmes, adjustment and reintegration in the aftermath of victimisation. Quantitative data collected were subjected to two levels of analysis. The first level was a univariate analysis which addressed the description of the socio-demographic and economic characteristics of respondents, and incidence of crime reporting that emerged from different geographical locations within the study site. Simple percentages, frequency distribution tables and graphs were used to provide general overview of the various socioeconomic that affect respondents' reporting practices from different spatial environments. The second level of analysis is bivariate analysis which involved the examination of the pattern of relationship between the dependent variable (crime reporting) and community capacity building variable.The qualitative data collected through hand written notes and tape recorders were transcribed and used for data analysis. The analysis was focussed on comparing the responses of respondents from the three selected senatorial district area locations to see whether a similar pattern of responses existed among them. Based on these themes, global summaries of the views on each objective were synthesized, analyzed and some striking expressions were pulled out for ethnographic summaries. Data gathered from residents in rural, semi urban and urban locations were finally compared to see whether they were related and had implications for crime control in society.

III. Results

a) *Characteristics of Respondents*

Table 1 provides the selected socio-demographic characteristics of the respondents. The sample included 66.1% of males and 33.9% of females. The proportion of male to female has positive cultural implications for crime reporting in the study area. In some important ways, age affects exposure to, avoidance and report of victimisation. In this study, a 10-year age grouping was used. The age patterns of respondents indicated that respondents between the age brackets of 21-30 and 31-40 years account for 72.4% of the total study population; 27.8% of respondents were between 31 – 40 years; about 44.6% of the entire study population is between ages 21 – 30 years; 14.2% fall between 41 – 50 years; 11.4% respondents were 51 years and above while only 1.9% of respondents were aged less than 20 years. The data

on Table 1 indicate that 61.2% of respondents had tertiary education; secondary education (20.3%), primary education (10.4%) and no formal education (8.1%)

Data on marital status of respondents reveal that 46.5% of the respondents is single, married (44.6%), separated, divorced or widowed (8.9%). Also, data show that majority (68.7%) of the respondents are Yoruba, Igbo (20.6%) while Hausa and those from other ethnic groups (10.8%) respectively. The distribution of respondents by religion shows that Christians constituted 56.3% followed by Muslims (42.7%). Traditional and other religions had 0.9 percent. About 54.4%; 38.6% and 7.0% of the respondents lived in semi-urban, urban and rural communities of Lagos respectively. In addition, 62% of the respondents were businesspeople, 27.2% are either students, applicants, apprentices or retirees while 11.1% are civil servants. In most cases, particularly in capitalist environments, occupation is a critical determinant of income. Respondents who earned N10, 000,000 and above constitute the majority (58.6%) in the study.

b) Resources that Boost and Encumbrances that Inhibit Respondents' Capacity for Crime Reporting

In Table 2, respondents identified a number of police practices which reduced effective victims' crime reporting in the study site. More respondents (51.4%) considered bribery as the most discouraging police practice that keeps victims away from gainful crime reporting practices. Next is ineffectiveness (49.1%); corruption (48.1%); lack of integrity (47.4%); police complicity in crime (40.0%) and nonchalance (33.3%). On the cultural beliefs that influence crime reporting, 58.0% of the respondents identified ethnicity, 56.8% respondents had no idea, traditional voodoo (46.9%), sex (47.8), witchcraft (46.2%), age (45.2%) and no beliefs (42.5%). In terms of the extent to which places of worship influence crime reporting in the community, 54.2% of the respondents said it indoctrinates crime reporting; positively persuades crime reporting (48.0%); they have no influence whatsoever on crime reporting (38.1%) and they negatively persuade crime reporting (20.0%). While 49.1% of the respondents admitted that taboos have no influence on crime reporting, 47.2% s suggested fear of exclusion as a means of discouraging crime reporting and 45.3% agreed that some taboos actually encourage crime reporting.

Examining the influence of home training on crime reporting, 49.2% of the respondents said home training can imbue children with the courage to report crime to earn justice; the fear to report crimes may be inherited from parents by children (49.0 %), home training can serve as a control against crime reporting (45.9%); home training has no effect on crime reporting (43.8%) and home training can cause children as future adults to internalise dissent (38.3%). Considering the extent of influence which extended family connection has on crime reporting, 62.2% of the respondents said it discourages crime reporting, extended family connections offer cooperation that sometimes conceals household crimes (46.9%), they encourage crime reporting (43.0%) and put considerable sympathy behind the crime reporter (42.9%).

Table 3 shows the reasons that compel extended family connections to influence crime reporting, 54.9% of the respondents said the nuclear family option is rapidly replacing extended family, civilization (19.8%), religion(17.9%), no effect (5.5%) and others(1.9%). While 65.0% of the respondents said traditional ways of crime control in the communities influence crime reporting, 35.0% disagreed. On the traditional ways of crime control influence crime reporting, 54.2% of the respondents admitted it is by referral, partnership (52.9%), community place compliant (52.3%), information (52.1%) and provision of back up resources (50.0%). Considering the taboos that influence crime reporting, 53.3% of the respondents said taboos do not exist, incestuous conduct is a private affair (53.0%), children do not report crimes (46.9%), reporting crime is not the norm (45.6%) and women do not report crimes (38.9%).

c) Qualitative Evidence

The evidences from case study, in-depth and key informant interviews indicate that respondents lacked appreciable crime reporting capacity building facilities in the study site. With the people's abiding faith in their conventional crime reporting impeding stereotypes and taboos, only a marginal portion of the victimisation that respondents experienced actually got to the notice of the police.

A female in-depth interview respondent observed:

> Why must a woman who strongly feels her privacy has been recklessly invaded wait to have approval from a man who is her father, husband, uncle or something before seeking redress through lawful means? I do not want my girl children to face the ordeal I was socialised to endure. To desirably equip her, government should, therefore, ensure that equal right of crime reporting is accorded her and she is thought to assert her crime reporting right in school , not necessarily by proxy.

A male in-depth interview respondent acknowledged:

> Up till today, some residents maintain solidarity with criminals which make the crusade for improved crime reporting a little bit problematic. Rather than joining crime reporters to condemn the bad conduct of offenders some community people take solace in fraternising with criminals by discrediting and describing crime reporters as intolerant of neighbours. This is rather demeaning because it is anti culture.

A sixty five year old male in-depth interview respondent noted:

> In some communities, especially rural areas in which tradition is more intense in compliance by community residents, a family from which reports of crime to the police emanate as a matter of principle may be labelled as rebels. Consequently, some members of the same community may exclude members of the crime reporting families in terms of socio-economic and even cultural interactions.

A fifty four year old female in-depth interview respondent admitted:

> I hate the police because in or outside their stations, nothing goes for nothing. If you report a crime without greasing the palms of the police, you may end up becoming the criminal if the actual offender is richer and more generous to the police. They will bribe the police who will in turn teach the criminals the loopholes to explore to make criminals become slippery for the law to track down and supply them with the technical points to inescapably incriminate the original crime reporter. This is why potential crime reporters see police stations as commercial points for the exchange of justice with injustice which is not healthy for the effective partnership against crime.

A male key informant interview respondent observed:

> What members of the public do not understand is that he who goes to the police first may not be the righteous one in law. If you want to go to equity, at least you should equip yourself with clean hands. Quite often, investigations have shown that persons who rush to the police have adversarial intensions to conceal to the authority. When their claims are weighed against evidences, they are often proven beyond every reasonable doubt that they are the criminals and not crime reporters they claim to be.

Finally, a seventy three year old in-depth interview noted:

> There is yet no structured effort made by public policy to introduce culturally acceptable means by which crimes could be reported without running the risks of paying dearly for that civil service initiative. Police ethos as they are presently understood and used does not support members of the public to report crimes. The criminals seem more protected than information providers in the regime that subsists. There may be the need for members drawn from across the various strata making up all the communities to evolve culturally useful and useable norm of crime reporting to make contemporary communities safer to live in.

IV. Discussion

There have been fears as to the safety of crime victims and witnesses who desire to volunteer information to the police. Religion is considered the beliefs and practices associated with the supernatural. It is in this connection that the resort to the patronage of informal social control mechanism by community dwellers in Lagos becomes instructive. The preponderance of Yoruba in the study should not be surprising; given that the study was conducted in Yoruba speaking communities. Nigeria is a multi-ethnic state with about 350 ethnic groups (Otite, 1979). This ethnic variety is found in towns and cities throughout Nigeria. Ethnicity is an important variable in the study of demographic characteristics of a population. All over the world, ethnic groups have cultural norms, beliefs and practices which influence decision making in the context of how individuals and groups live their daily lives, appreciate positive interactions and respond to conflictual ones accordingly. The latter essentially include crime reporting. Quite generally, marital status has demographic, economic, socio-cultural implications for crime reporting. These probably underlie the universal recognition of marriage as the main social arrangement within which cultural socialisation primarily takes place. Considering the critical role which education could play in mobilising respondents to report crimes or not, this variable was among the many considered in the present study. Through education, cultural knowledge, values, norms and competences of a people are transferred to their younger generation to enable them develop a shared understanding of the dynamics of offences, their effects and report much in ways that most community dwellers will find culture consistent and therefore pleasing.

Every peaceful environment appreciating government will enable development for its subjects so as to establish and sustain social order in communities under its domain of influence. Consequently, it should stimulate the making of crime, criminal victimization and public responses to them issues of community concern. If 57.8% of respondents who are in the age category of 41 – 50 years reported more crimes in this study, then, it is consistent with earlier studies conducted by Sampson and Bartusch (1998), Kusow, Wilson and Martin (1997) and Correia and Lourich (1996). However, individuals within these age brackets are frequently more powerful than those younger and older than them. As a result, their strength makes them more able to acquire easily stolen items. They are expected also to possess more vigorous power of expression and determination that enable them fight for their rights. These may make these respondents pursue the reporting of crimes in the study area more passionately and strengthen the belief that older persons view police more favourably than younger persons. What role then did citizens between 18 and 40

years play in the communities in terms of crime reporting? Young people's active lifestyles tend to attract considerable proactive police intervention (Crawford, 2009; Hopkins, 1994; Loader, 1996) because, too often, they have a greater propensity to engage in behaviour which challenges and confronts the established structures and agencies of authority (Hartless, Ditton, Nair, & Philips, 1995; Radford, Hamilton, & Jarman, 2005). In fact, youth and young adults commit a disproportionate amount of crime in Canada. In 2009, for instance, age-specific rates for individuals accused of crime were highest among those aged 15-22, with the peak age at 17 (Dauvergne & Turner, 2010). Why are respondents within this age cohort passive if they played no remarkable role in crime causation? What should they have done? What could have prevented them from performing the heroic task of keeping their communities crime-free through crime reporting?

However, a few other studies including Cao, Frank and Cullen (1996) did not find age to be important. Findings regarding the impact of gender are relevant here. This study found males reporting crimes 7.2% more than females. Some researchers, including Correia, Reisig and Lourich (1996) corroborated the above finding. However, Cao, Frank and Cullen (1996) found females to be more positively disposed toward the police compared to males. Why are females' reporting rate lower? Are they inhibited by culture? What role does the fact of marriage play in female crime reporting? How can this shortfall be addressed? It is not surprising that the sample contained more male than women. In the study site, more commonly, male adults are more culturally held to have a healthier credential for crime reporting than females. For example, anecdotal evidences have it that in most homes, male household heads will consider it an affront for their wives to report crimes for which they had not given their tacit prior approval to the police. Findings of the present study confirmed that rural residents view police more favourably than the urban residents. Respondents' places of residence play a significant role in the formation of beliefs, values, attitudes and behaviour patterns which eventually determine their perceptions and direction of responses to crime events. Contrary to the observations of Brown and Benedict (2002) that some studies have found that rural residents view police less favourably than residents of urban areas, why, in the study site, did the urban residents view police less favourably than rural residents? In rural communities of Lagos, crime reporting taboos and stereotypes exist in abundance, how come these taboos and stereotypes not have equally overwhelming impact on victimisation in the rural communities that went so high as to 87.9% without a corresponding effects which only allowed 59.1% of victimisations to be reported to the police in the rural communities of Lagos. Rural norms do not favour bribery or immediate gratification even if they do delayed appreciation.

This study therefore expands the frontiers of public knowledge about encumbrances that prevent community residents from freely reporting their victimisation experiences to the police. Specifically, within the functionalist theoretical framework, the current study investigated the effects of social networks of individuals on a victim's decision to report crime to police. Using this framework, the present study demonstrated the significant influence of individuals, being functional constituents, on the dynamics of reporting decisions among respondents in the study site. Current findings established that the social network in which victims decide whether or not to notify the police about their victimisation is complex. It involves community norms of items forbidden as practices that are not condoned in communities. For example, contemporary American society is dominated by the norms of minding one's own business (Batson, Duncan, Ackerman, Buckley, & Birch, 1981; Cialdini, Brown, Lewis, Luce, & Neuberg, 1997; Stürmer, Snyder, & Omoto, 2005) which is rapidly displacing Africans' normative belief in being their brothers' keepers. This normative explanation has been used to understand and explain actions related to a variety of crime contexts, such as bystander intervention (Hart & Miethe, 2008; Luckenbill, 1997; Miethe & Deibert, 2007; Miethe & Regoeczi, 2004). Following this theoretical explanation, though semi-urban and urban witnesses and victims might have played passive roles in crime reporting because they felt that nothing will accrue to them from reporting, the efficacy of norms of items forbidden as unacceptable practices in the communities, taboos and stereotypes should not be swept under the carpet.

V. Conclusion

The present study presents a pioneering insight into the growing need for community capacity building initiative that has received little prior research attention for the purpose of enabling community residents partner with justice systems so that community safety in the study area is guaranteed. Since the challenge for law enforcement is to equally protect and serve people from all backgrounds, though the complexities of policing multicultural communities are numerous (Shusta, Levine, Harris & Wong, 2002), the findings of the present study have policy and practical implications for crime reporting actors in the communities, traditional crime control framework and societal institutions. Capacity building is a critical component in a broader set of enabling requirements for meaningful community ownership and support effectiveness. If these are not structured in ways that make community residents active participants in the crime reporting enterprise, the collective intention to solve crime may become elusive.

There should be desirable synergy between community people and the police such that both parties will see one another as partners in progress along the direction of making the community liveable and deprived of intimidating victimisation. The study therefore concluded that until victims recognise that their relative safety depends on their ability to effectively put local intelligence behind police crime fighting efforts through crime reporting, most residents will not access all available crime reporting resources to make Lagos communities safer. It therefore recommends that government should, in the interim, criminalize all stereotypes against crime reporting and as a long term solution, include crime reporting capacity building values, norms and attitudes into education curricula right from primary through secondary to tertiary levels in Nigeria.

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Table 1 : Socio Economic Characteristics of Respondents

Variable	Frequency	Percentage
Sex		
Male	627	66.1
Female	321	33.9
Total	948	100
Age		
Less than 20 years	18	1.9
21 – 30	423	33.2
31 – 40	264	27.8
41 – 50	135	14.2
51 and above	108	11.4
Total	948	100
Education		
No Formal Education	77	8.1
Primary Education	99	10.4
Secondary Education	192	20.3
Tertiary Education	580	61.2
Total	948	100
Marital Status		
Single	441	46.5
Married	423	44.6
Separated/Divorced/Widowed	84	8.9
Total	948	100
Ethnicity		
Ibo	195	20.6
Hausa/ Others	102	10.8
Yoruba	651	68.7
Total	948	100
Religion		
Christianity	534	56.3
Islam	405	42.7
Traditional/Others	9	.9
Total	948	100
Residence		
Urban	366	38.6
Semi urban	516	54.4
Rural	66	7.0
Total	948	100
Occupation		
Civil Servant	105	11.1
Business Person	585	61.7
Student/Applicant/Apprentice/Retiree	258	27.2
Total	948	100
Annual Income In Naira		
No Income – N 1,000,000:00	219	23.1
N 2,000,000 – N 5,000,000	99	10.4
N 6,100,000 – N 9,000,000	74	7.8
N 10,000,000 and above	556	58.6
Total	948	100.0

Source : Author's Field Survey, 2012

Table 2 : Resources that Boost and Encumbrances that Inhibit Respondents' Capacity for Crime Reporting

Police Practices that Inhibit Reporting	Respondents' Report of The Incident of Crime					
	Yes		No		Total	
	%	N	%	N	%	N
Bribery/Extortion	51.4	(162)	48.6	(153)	100	(315)
Ineffectiveness	49.1	(81)	50.9	(84)	100	(165)
Corruption	48.1	(111)	51.9	(120)	100	(231)
Nonchalance	33.3	(30)	66.7	(60)	100	(90)
Lack of Integrity	47.4	(54)	52.6	(60)	100	(114)
Police Complicity in Crime	40.0	(6)	60.0	(9)	100	(15)
Others	50.0	(9)	50.0	(9)	100	(18)
Total	47.8	(453)	52.2	(495)	100	(948)
Chi sq. p v = > .05						
Cultural Beliefs that Influence Crime Reporting						
Sex	47.8	(75)	52.2	(82)	100	(157)
Age	45.2	(57)	54.8	(69)	100	(126)
Witchcraft	46.2	(117)	53.8	(136)	100	(253)
Ethnicity	58.0	(58)	42.0	(42)	100	(100)
No Beliefs	42.5	(31)	57.5	(42)	100	(73)
Traditional Voodoo	46.9	(83)	53.1	(94)	100	(177)
I Have No Ideas	56.8	(21)	43.2	(16)	100	(37)
Others	44.0	(11)	56.0	(14)	100	(25)
Total	47.8	(453)	52.2	(495)	100	(948)
Influence of Places of Worship on Crime Reporting						
Positively Persuades Crime Reporting	(363)	48.0	(393)	52.0	(756)	100
Negatively Persuades Crime Reporting	(3)	20.0	(12)	80.0	(15)	100
Indoctrinates Crime Reporters	(39)	54.2	(33)	45.8	(72)	100
No Influence on Crime Reporting	(24)	38.1	(39)	61.9	(63)	100
Others	(24)	57.1	(18)	42.9	(42)	100
Influence of Taboos On Crime Reporting						
Fear of Exclusion discourages Reporting	(257)	47.2	(287)	52.8	(544)	100
Taboos Encourage Crime Reporting	(29)	45.3	(35)	54.7	(64)	100
Taboos Have No Influence On Reporting	(167)	49.1	(173)	50.9	(340)	100
How Home Training Influences Reporting						
Control	(67)	45.9	(79)	54.1	(146)	
Internalises Dissent	(23)	38.3	(37)	61.7	(60)	100
Courage to Report to Earn Justice	(324)	49.2	(335)	50.8	(659)	100
Fear to Report May be Transferred to Children	(25)	49.0	(26)	51.0	(51)	100
Home Training has No Effect on Crime Reporting	(14)	43.8	(18)	56.3	(32)	100
How Extended Family Connection Influences Reporting						
Encouragement	(99)	43.0	(131)	57.0	(230)	100
Sympathy	(48)	42.9	(64)	57.1	(112)	100
Cooperation Sometimes Conceals Household Crimes	(214)	46.9	(242)	53.1	(456)	100
Discouragement	(61)	62.2	(37)	37.8	(98)	100
Other	(31)	59.6	(21)	40.4	(52)	100

Source : Author's Field Survey, 2012

Table 3 : Resources that Boost and Encumbrances that Inhibit Respondents' Capacity for Crime

Police Practices that Inhibit Reporting Chi sq. p v = > .05	Respondents' Report of The Incident of Crime					
	Yes		No		Total	
	%	N	%	N	%	N
Effect of Traditional Crime Control on Reporting						
Referral	45.8	(77)	54.2	(91)	100	(168)
Through Partnership	47.1	(114)	52.9	(128)	100	(242)
Information	47.9	(116)	52.1	(126)	100	(242)
Provision of Back Up Resources	50.0	(104)	50.0	(104)	100	(208)
Community Place Compliant	47.7	(42)	52.3	(46)	100	(88)
Total	47.8	(453)	52.2	(495)	100	(948)
Taboos that Influence Crime Reporting	*Chi sq.* p value = < .05					
Reporting Crime Is Not The Norm	45.6	(47)	54.4	(56)	100	(103)
Women Do Not Report Crimes	38.9	(49)	61.1	(77)	100	(126)
Children Do Not Report Crimes	46.9	(150)	53.1	(170)	100	(320)
Incestuous Conduct Is A Private Affair	53.0	(178)	47.0	(158)	100	(336)
Taboos Do Not Exist	53.3	(24)	46.7	(21)	100	(45)
Others	27.8	(5)	72.2	(13)	100	(18)
Total	47.8	(453)	52.2	(495)	100	(948)
How Crime Reporting Ensures Community Safety						
Police Using Victims Reported Crime Data	(57)	48.0	(75)	56.8	(132)	100
Impartiality of Police In Law Enforcement	(72)	48.0	(78)	52.0	(150)	100
Punishment of Criminals	(60)	50.0	(60)	50.0	(120)	100
Protection of Crime Reporters	(96)	51.6	(90)	48.4	(186)	100
Creation of Awareness for other Community Residents	(27)	39.1	(42)	60.9	(69)	100
Safeguards Future Occurrence	(99)	45.2	(120)	54.8	(219)	100
Crime Reporting Cannot Cause Community Safety	(18)	54.5	(15)	45.5	(33)	100
Crime Reporting Can Lead to Earlier Crime Detection	(18)	54.5	(15)	45.5	(33)	100
Others	(6)	100.0	(0)	0.0	(6)	100

Source : Author's Field Survey, 2012

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Note :

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· Present your points in sound order

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- Fundamental goal
- To the point depiction of the research
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- Center on shortening results - bound background information to a verdict or two, if completely necessary
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Approach:

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	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
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References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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