INTRODUCTION
A broad knowledge of both the external and internal anatomy of teeth is of great importance for adequate endodontic treatment. Human dentition presents a variety of anatomical and morphological variations. However, the reported incidences of such variations in the maxillary central incisors are very few. Maxillary central incisor has one root and one canal but recently a few cases of dual-rooted maxillary central incisor have been reported in literature. Maxillary central incisors vary in root length with reported average length of 22mm to 23.8mm.

Weine in 1976 published a data for average tooth lengths in North Americans which were obtained from working lengths of his patients using the radiographic method. In an in-vitro study by Okpo and Akpata in 1986, the length of maxillary central incisor was reported to range from 20.0-28.0mm with a mean of 23.8mm. There is however a dearth of literature on length of maxillary central incisor among black Africans using clinical studies.

The following case report describes the endodontic management of a patient with an unusually long maxillary central incisor in our environment.

CASE PROFILE
A 31 year-old male was referred for the treatment of discolored left maxillary central incisor. He noticed the discolouration of the tooth seven years before presentation, which could not be associated with any known cause. There was associated pain and swelling with pus discharge four years before presentation which subsided after medication. His medical history was unremarkable and non-contributory.

Clinical examination revealed a discoloured, mesiobially rotated left maxillary central incisor.

Radiograph revealed a well circumscribed peri-apical radiolucency with sclerotic border in relation to left maxillary central incisor (Fig. 1). An assessment of periapical cyst was made and patient scheduled for root canal treatment followed by peri-radicular surgery for cyst enucleation.

The tooth was isolated with rubber dam. Access gained to the pulp chamber from the palatal surface a triangular shaped cavity with apex pointing to the cingulum and base towards the incisal edge. Canal was located and the pulp was already necrotic. A 25 mm ISO size 25 K file (Premier Dental Products Co, Canada, PA.) was used to enlarge the canal and clean the coronal third using ultrasonic in a retrograde fashion.
placed in the root canal at full length without encountering any resistance, radiograph taken revealed that the file was short of the radiographic terminus by 4mm. Therefore, a size 31mm ISO size 25 Kfile was then placed in the root canal at 29mm using digital tactile sensation and the repeated working length radiograph showed that the file was at the radiographic

**Fig 1: Pre-op periapical X-ray view**

was dried with paper points and a non-setting calcium hydroxide (Rite Dent Corp. Fl, USA) dressing was placed within the canal and access cavity restored temporary with zinc phosphate cement (Prime Dental Manufacturing Inc., Chicago, Illinois). The Patient was

**Fig 2: Working length determination**

recalled a week after. Tooth was asymptomatic and not tender to percussion, canal was dry and not foul smelling. After removing the non-setting calcium hydroxide dressing in the canal, the canal was re-instrumented and copiously irrigated and then dried with paper points. Thereafter, the master cone was selected, radiograph taken to ensure it is at the

**Fig 3: Master cone selection**

**Fig 4: Immediate post-obturation**
Clindamycin) 300mg 12 hourly for 5 days and
diclofenac sodium 50mg 8 hourly for 4 days to be
taken after food. Patient was reviewed 24 hours post-
operatively and a week to remove sutures. Subsequent
follow up was done after a month, three months (Fig.
5) and at six months. The excised specimen was sent
to oral pathology laboratory for histopathological
examination, the result of which came as periapical
cyst.

A month after the surgery, non-vital walking bleaching
of discoloured tooth was commenced using a mixture
of sodium perborate and 30% hydrogen peroxide.
The gutta percha was reduced to 2mm below the
cervical margin of the tooth, adequate toileting and
drying of cavity done. A layer of hard setting cement
such as glass ionomer cement was placed over the
gutta percha (to act as a barrier preventing percolation
of the superoxide radicals). A thick paste of the
sodium perborate and 30% hydrogen peroxide was
then placed within the access cavity and sealed off
with zinc phosphate cement. After four applications
of bleaching agents at one week interval, a satisfactory
shade comparable to the adjacent tooth was obtained.
The access cavity was restored with composite resin.

At three month post operative review visit, the tooth
was clinically asymptomatic and radiographically, there
was evidence of healing at periapical region evidenced
by reduction in size of the radiolucency and loss of
sclerotic margin in comparison with pre-operative
radiograph.

**Fig 5:** Three (3) months post-periradicular
curettage

radiographic terminus (Fig. 3). The root canal system
was obturated by lateral compaction of gutta- percha
coated with a calcium hydroxide based sealer
(Sealapex-Sybron/Keer USA) and acess cavity restored
with zinc phosphate cement (Fig. 4).

Four weeks later, the patient had periradicular surgery.
The cystic lesion was enucleated after exposing the
periapical region via a three-sided full thickness
mucoperiosteal flap and apical curettage was done. The
apical end of the tooth was intact and therefore was
not resected (Fig. 6a). Post-operative instructions was
given and patient placed on Dalacin C (a brand of

**Figure 6a&6b** showing patient’s clinical photograph immediately after cystic enucleation with curettage, and
immediate post-operative with replacement of mucoperiosteal flap held in place by sutures respectively.
DISCUSSION
The average root canal length in a population is an important aid in working length determination during root canal therapy, most especially when using digital tactile method. The average length of maxillary central incisor reported by Black in 1902 was 22.5 mm with a range between 18 and 27 mm. Bjorndal et al. in 1974, found an average length of 23.7 mm and a maximum length of 27.3 mm in their study. Kims et al. in 2005, while comparing the root canal length between Asians and Caucasians, reported mean value of maxillary central incisors' canal length of 22 mm and 23.5 mm for Asians and Caucasians respectively with a significant difference of 1.5 mm.

There have been some case reports of unusually long maxillary central incisors in the literature. In 1988, Booth reported a case of extracted maxillary central incisor in a 31 year old female Australian, measuring 30 mm. Cohenca et al. in 1996, reported endodontic retreatment of unusually long maxillary left and right central incisors with working lengths of 32 mm and 33 mm respectively.

The patient described presents a maxillary central incisor with working length of 29 mm, which falls in the upper limit of reported normal range,6,7 it is however unusually long based on our clinical experience. Since the quoted normal range of canal lengths were from studies in Caucasian population and racial differences in canal lengths have been reported10, this case might actually be unusually long for our population.

CONCLUSION
Though other studies have reported longer canal length and the case presented represents an upper limit of the normal as reported by some studies, it is still unusual in our environment. Therefore, adequate preparation must be made for proper management of such cases when encountered.

RECOMMENDATION
Since studies on teeth anatomy, morphology and their lengths were mostly based on Caucasian7,10 and very few Africans8,13 populations, there is still a need to carry out more studies in African populations to determine the normal range of root canal length for Africans.

REFERENCES