

Local Diagnostic Reference Levels For Adult Posteroanterior (PA) Chest X-ray Examination in

Addis Ababa, Ethiopia.

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Purpose

- PA chest x-ray is the most commonly requested x-ray examinations in the world.
- periodic dose assessments should be made to encourage the optimization of the radiation protection of the patients
- several dose surveys shows that there is significant variations in patient doses between different radiological departments for the same type of examination.

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- The reason justifies dose assessment in order to optimize the diagnostic radiology practice.
- Diagnostic Reference Levels (DRLs) help to facilitate standardization and optimization within departments and encourage the reduction of dose variations between hospitals.

MATERIALS AND METHODS

- The study utilized a cross-sectional study design
- The tube output measurement was taken in a scatter-free geometry, for a peak tube voltage of 80 kVp, exposure current–time product of 20 milliamperere second (mAs) and a focus-to-detector distance of 100 cm, using dositime dx X-ray digital dosimeter and exposure time meter.

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- The sample size was determined based on ICRP recommendations to conduct such study.
- The entrance dose in air was measured in eight hospitals comprising nine X-ray units and a sample of 192 radiographs
- Quota sampling was used to include 24 patients visiting the X-ray unit of the respective Hospitals
- Confidentiality of information was maintained

The ESD was calculated using the following relations

$$ESD = (O/P) X \left(\frac{KVp}{80} \right)^2 X (mAs) \left(\frac{100}{FSD} \right)^2 X (BSF)$$

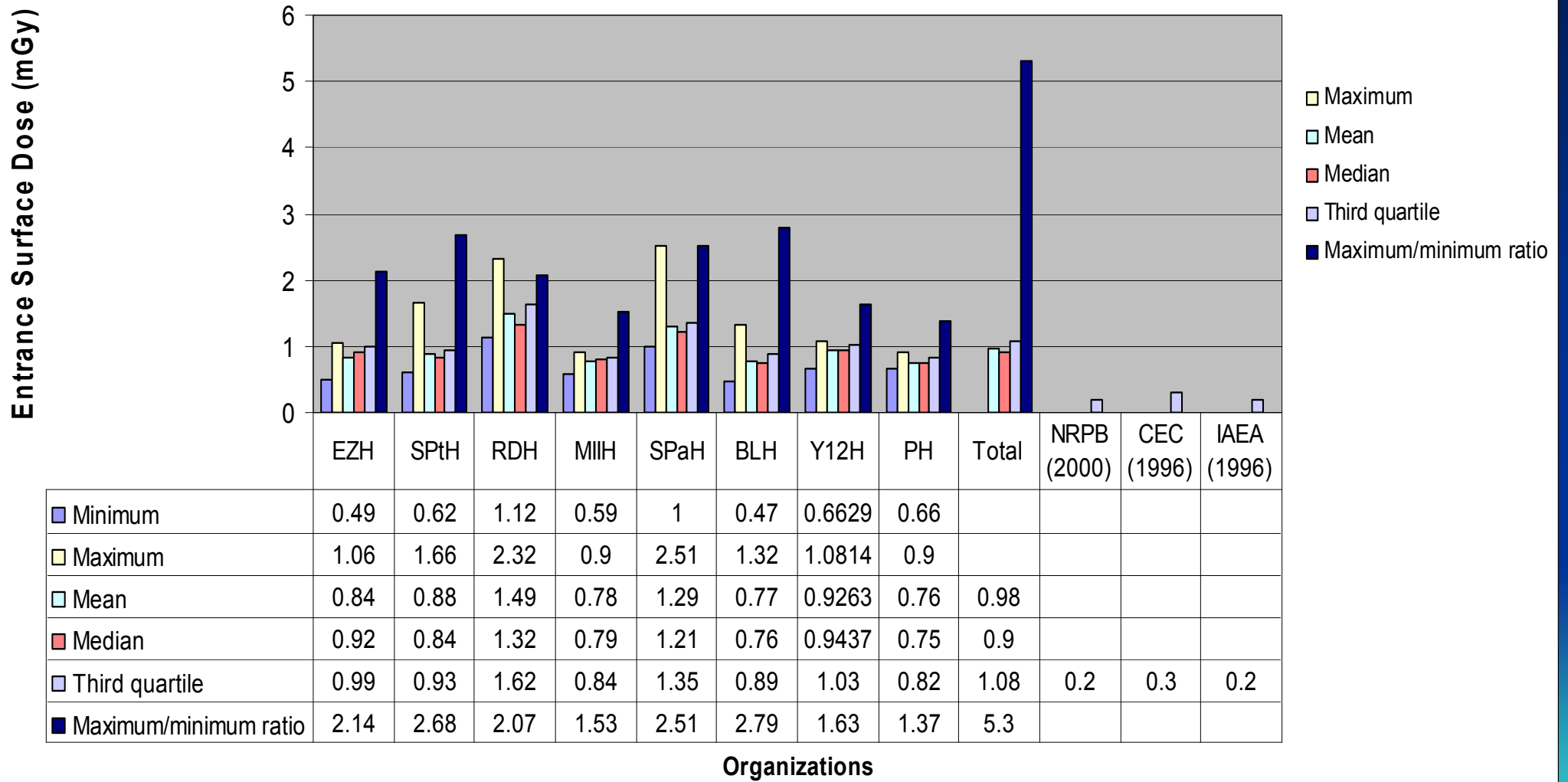
A value of 1.35 was used in this study for
Back Scatter Function

Results :The third quartile value of the distribution of mean doses at individual hospitals participating in this survey is found to be 1.08 milligray (mGy).

Table 2. A comparison the range of KVp, mAs, median of FFD and the mean values ESD for PA chest X-ray examinations in some studies

Parameter	This Study	Sudan (2006)	Iran (2008)	Previous study (Ethiopia)		
				Mulubirhan (2001)	Alemu. T (2005)	IAEA and CEC on two hospitals(2005)
kV _p	60-100	50–76	75-85	50-70	-	-
mAs	8-80	3–32	5-25	14-45	-	-
ESD	0.96	0.19	0.35	1.24	1.54	0.94/1.84
FFD	150	180	-	150	150	150

Fig 1 Comparison of hospital means ESDs obtained in the present work with some international reference dose values (in mGy)



DISCUSSION

- The calculated ESDs were found to be greater than the corresponding DRLs recommended by NRPB, CEC and IAEA because all hospitals were using low kVp, high mAs and Low FFD
- Weight measurements performed for all showed that the median patient weight was 55 kg.
- This median patient size was lighter compared with the median patient size of 70 kg recommended by ICRP

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- As the dose increases with weight, it is possible to adopt the dose–weight adjustment of 2% per kg as recommended by Hart and Sharimpton.
- Thus, the dose levels obtained in the present study would have to be increased by 30% in order to be comparable directly with the established international reference doses.
- **conclusion** the results of the present study indicate a need for Quality Assurance (QA) programs to be undertaken to avert considerable cost and high patient doses