

The Cancer Burden and the Hospital Capacity for Diagnosis and Treatment in Chad: A Synthesis of Published Data and a Roadmap for Radiology, Radiation Protection and the Nascent National Registry

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Publication Date: 2026/10/06

Abstract: Chad enters the epidemiological transition with one of the most constrained health care systems in the world. This synthesis gathers the published data available on the cancer burden and on the country's hospital capacity for diagnosis and treatment. IARC Globocan estimates put the burden at 18,655 new cases and 12,047 deaths per year, a mortality-to-incidence ratio of about 65 %, dominated by prostate (3,340 cases), breast (3,103), cervical (2,348) and liver (2,064) cancers. In contrast, the National Health Policy 2016-2030 documents 2.74 core health professionals per 10,000 inhabitants against a WHO benchmark of 23, 0.96 health facility per 10,000 and 3 hospital beds per 10,000; the country has no radiotherapy unit, and the national cancer registry launched with WHO support in August 2021 recorded only about 300 annual diagnoses in N'Djamena before its creation, indicating massive underdiagnosis. The article confronts these two data series, describes the actual capacity of N'Djamena's referral hospitals, including the first interventional radiology days held in 2025, and proposes a five-track roadmap: registry, imaging and radiation protection under Law No. 006/PR/2009, pathology, a first oncology platform, and financial protection against medical evacuations. Detailed methodological analyses are published separately [1-4].

Keywords: Cancer; Chad; Globocan; Cancer Registry; Radiology; Radiotherapy; Health System; Sub-Saharan Africa.

How to Cite: Govondandi Lakreo Y.; Shalom Boukar M.; Boukar M.; Mbozo'o Mvondo S.; Mangsou Y.; Goultonga Gapili F.; Moifo B. (2026) The Cancer Burden and the Hospital Capacity for Diagnosis and Treatment in Chad: A Synthesis of Published Data and a Roadmap for Radiology, Radiation Protection and the Nascent National Registry.

International Journal of Innovative Science and Research Technology, 11(9), 2939-2943.

<https://doi.org/10.38124/ijisrt/26sep1342>

I. INTRODUCTION

The four methodological articles we publish elsewhere, on the assessment of radiological and industrial risks [1], the radiation protection of a referral radiology room [2], the clinical effects of radiation in vulnerable persons [3] and the management of mobile-network wave

risk [4], describe tools. The present article describes the terrain on which these tools must serve: a country of more than twenty million inhabitants whose cancer burden is now measurable, but whose hospital capacity for diagnosis and treatment remains among the weakest in the world. The aim is to gather in one place the published figures, international estimates, national health policy documents and institutional

information, to objectify the gap between need and capacity and to derive realistic priorities.

II. METHOD

Documentary synthesis of published sources, crossing four families: the Globocan estimates of the International Agency for Research on Cancer for Chad [5]; national documents, the National Health Policy 2016-2030 [6] and Law No. 006/PR/2009 on radiological safety and nuclear security [7]; WHO institutional publications on the cancer registry and health action in Chad [8, 9]; and public information on the hospitals and hospital missions of N'Djamena [10-12]. Globocan estimates for countries without a historical registry rely on modelling from neighbouring countries; they are presented here as orders of

magnitude whose verification is precisely the mission of the nascent national registry.

III. RESULTS

➤ The Estimated Cancer Burden

The Globocan estimates for Chad, a population of 20.3 million, put the annual burden at 18,655 new cases and 12,047 deaths [5]. Four sites concentrate nearly 60 % of cases: prostate (3,340 cases, 37.9 % of male cancers), breast (3,103 cases, 31.5 % of female cancers), cervix (2,348 cases, 23.8 % of female cancers) and liver (2,064 cases, driven by the viral hepatitis endemic). The mortality-to-incidence ratio, about 65 %, is the synthetic marker of late diagnosis and treatment deficit: in systems with screening and a complete platform, this ratio is below 40 %.

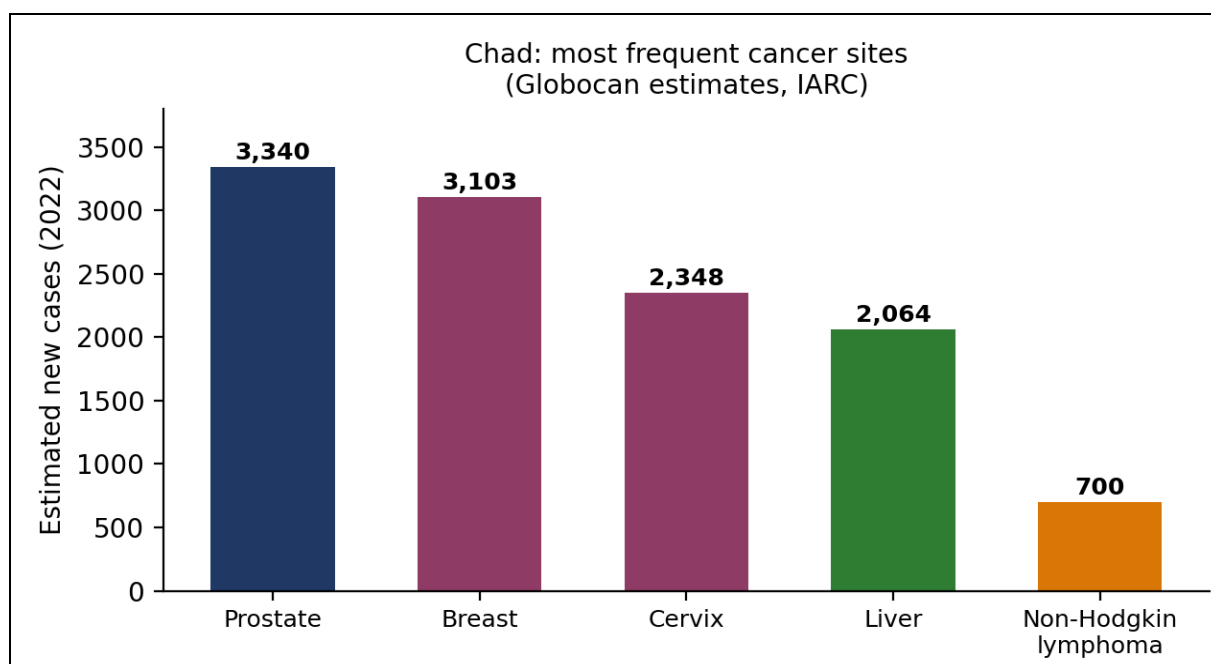


Fig 1 Most Frequent Cancer Sites in Chad, Estimated Annual New Cases, from IARC Globocan Data [5].

The contrast between these 18,655 estimated cases and the roughly 300 annual diagnoses recorded in N'Djamena before the registry's creation [8] measures the underdiagnosis: only about one case in sixty entered the documented circuit. The national registry, launched on 27 August 2021 with WHO support and operational from early 2022 [8], is the instrument that will substitute observed incidences for these modelled estimates.

➤ Health Care Supply Against Benchmarks

The National Health Policy 2016-2030 documents without complacency the structural deficit of supply [6]: 2.74 core health professionals per 10,000 inhabitants, against a WHO benchmark of 23; 0.96 health facility per 10,000 inhabitants, against a benchmark of 2; 3 hospital beds per 10,000 inhabitants, against 25 expected for a low-income country; 127 health districts and 1,290 responsibility areas to cover a territory of 1.284 million square kilometres. Progress is real, maternal mortality fell by 21.7 % between the 2004 and 2014 surveys, from 1,099 to 860 deaths per 100,000 live births, infant mortality from 102 to 72 per 1,000 [6], but the remaining gap is of an order of magnitude.

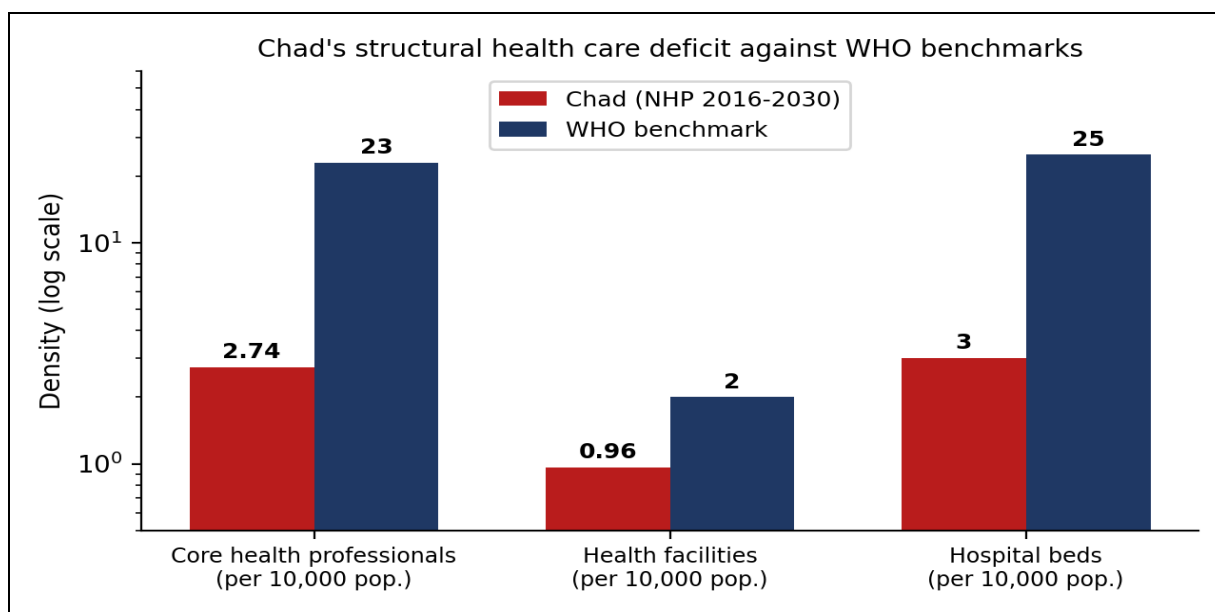


Fig 2 Densities of Chadian Health Care Supply against WHO Benchmarks, from the National Health Policy 2016-2030 [6]; Log Scale.

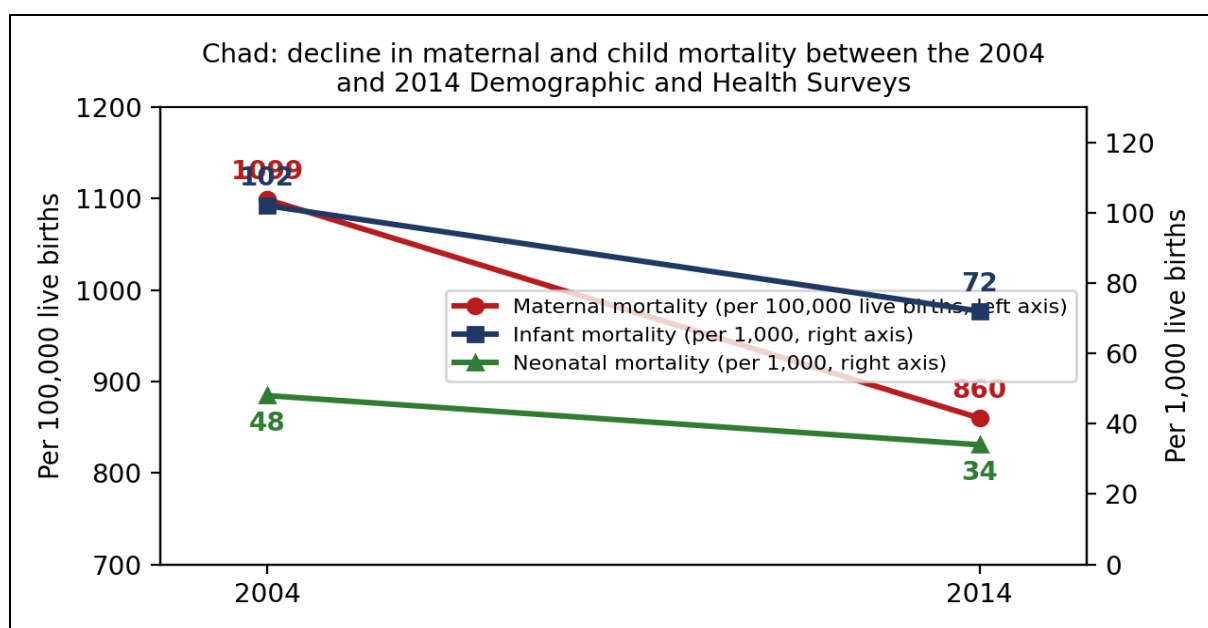


Fig 3 Evolution of Maternal, Infant and Neonatal Mortality Between the 2004 and 2014 Demographic and Health Surveys [6].

➤ Hospital Capacity for Diagnosis and Treatment

The cancer chain, screen, image, prove, treat, rests in N'Djamena on two pivotal institutions. The National General Referral Hospital, the public referral hospital whose units cover almost all routine needs [10], hosts the country's main public radiology department; it was on its platform that, with the FairEmbo mission of August 2025, the first interventional radiology days organised in Chad were held, opening the way to haemostatic and palliative embolisation [11]. The La Renaissance Hospital, built entirely on State funding of 34 billion CFA francs and inaugurated at the end of 2013 [12], provides the modern technical platform, CT included, and concentrates specialist consultations. On the other hand, the country has no radiotherapy unit: the IAEA DIRAC database, which inventories equipment worldwide,

lists Chad among the countries without any accelerator or telegamma source [13], while more than half of the 18,655 estimated annual cases would require irradiation with curative or palliative intent under international standards. Patients who can afford it leave on medical evacuation, at the expense of families or the State; the others give up.

The radiological regulatory framework exists: Law No. 006/PR/2009 on radiological safety and nuclear security institutes the authorisation and control regime for sources [7]. Its effective application, a resourced authority, inspections, national dosimetry, is the precondition of any scale-up of imaging and, tomorrow, of radiotherapy; the room audits we describe elsewhere [2] are its operational instrument.

➤ *A Five-Track Roadmap*

Table 1 Five Prioritised Tracks for the Decade, with their Instrument and Monitoring Indicator

Track	Main instrument	Monitoring indicator
1. Cancer registry	Consolidation of the registry launched in 2021 with WHO [8]	Completeness: recorded cases / Globocan estimated cases
2. Imaging and radiation protection	Application of Law No. 006/PR/2009 [7]; twenty-point room audits [2]	Share of authorised and audited facilities; continuous dosimetry
3. Pathology	A public reference laboratory in N'Djamena, telepathology	Biopsy-to-result delay; share of histologically confirmed cancers
4. First oncology platform	Safe chemotherapy at the two pivotal hospitals [10, 12]; interventional radiology [11]; IAEA radiotherapy dossier [13]	Active caseload treated in-country; number of evacuations avoided
5. Financial protection	Inclusion of cancer in the universal health coverage package	Share of out-of-pocket household expenditure

IV. DISCUSSION

Confronting the two data series draws a situation less desperate than the reading of densities alone suggests. On one side, the gap between 18,655 estimated cases and the described supply is such that no overall catch-up is credible within five years. On the other, the country's four dominant cancers share the property of being accessible to first-level interventions of low unit cost: hepatitis B and papillomavirus vaccination, visual cervical screening and treatment of precancerous lesions, early clinical and ultrasound diagnosis of breast disease, digital rectal examination and targeted PSA for prostate. In other words, the very structure of the Chadian burden, virus-induced cancers and screening-accessible cancers, makes primary and secondary prevention the country's most profitable treatment, while registry, pathology and a first oncology platform are being built.

The second lesson concerns data: the 65 % mortality-to-incidence ratio and the factor of sixty between estimated and recorded cases make measurement itself the first investment. A complete registry turns every figure of this article into a budget advocacy instrument, and every dosimetry or exposure measurement campaign, as we formalise them elsewhere [1, 2, 4], into proof of sound management before donors.

The limits of this synthesis are those of its sources: modelled estimates for epidemiology, policy documents for supply, institutional information for the hospitals; none replaces the systematic hospital survey, a national inventory of imaging equipment and specialist staff, which we call for and which only the ministry can conduct.

V. CONCLUSION

Chad counts, every year, nearly 19,000 estimated new cancer cases for about 300 documented diagnoses before 2021, no radiotherapy department and three hospital beds per 10,000 inhabitants. These published figures, gathered here, do not condemn to powerlessness: they order the priorities. Registry, applied radiation protection, pathology, a first oncology platform and financial protection form a roadmap whose every step is measurable and whose methodological instruments are now available, calibrated on

the country's practice [1-4]. The opening decade will tell whether Chad's epidemiological transition will have been suffered or prepared.

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