



# South Eastern Kenya University

## Understanding Wi-fi, and its Long-term Effect on Human Health

Presented by

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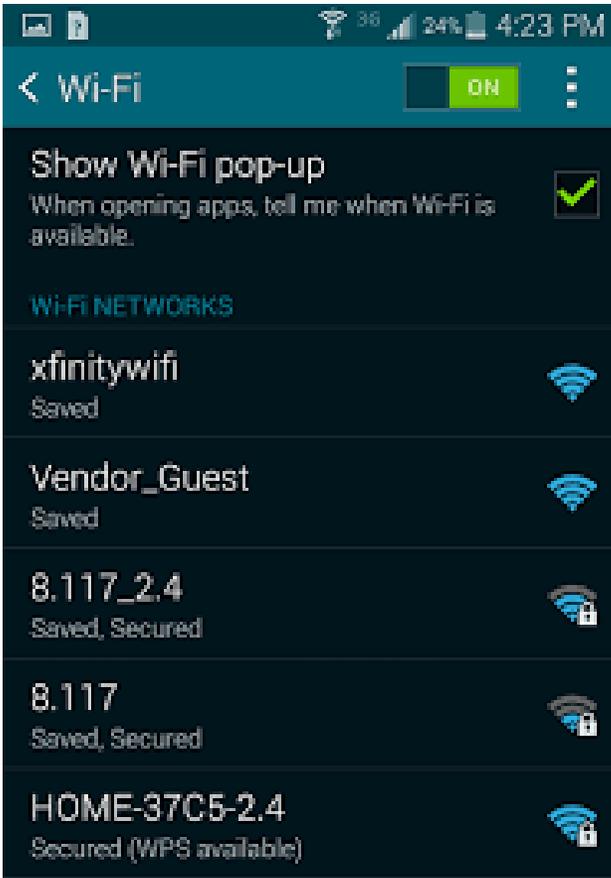


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# Wi-Fi (Wireless-Fidelity)

- Is a technology based on the IEEE 802.11 standards for transmission of data over a wireless medium
- Is also a trademark of the Wi-Fi Alliance, which restricts the use of the term *Wi-Fi Certified* together with a *special logo* to products that successfully complete interoperability certification testing.



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# Wi-Fi (Wireless-Fidelity)...

- Wi-Fi compatible devices can connect to the Internet via a WLAN.
- Such an access point (or hotspot) has a range of about 20 meters (66 feet) indoors and a greater range outdoors.
- Hotspot coverage can be as small as a single room with walls that block radio waves, or as large as many square kilometres achieved by using multiple overlapping access points.
- For best experience ensure line-of-sight.
- Wi-Fi signals attenuate through absorption, diffraction and reflection; in fact walls of certain materials can block the signal altogether.



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# Wi-Fi (Wireless-Fidelity)...

- Devices that can use Wi-Fi technologies desktops, laptops, smartphones, tablets, smart TVs, digital audio players, printers and many more. This is growing by the day.
- As a result...  
electrosmog?





# 1. Provokes Cardiac Stress

- In an certain study, data from 69 subjects between the ages of 26 and 80 in both Canada and the USA was collected and analyzed.
- Subjects were exposed to radiation for 3-min intervals generated by a 2.4-GHz cordless phone base station (3 – 8mW/cm<sup>2</sup>). A few participants had a severe reaction to the radiation with an increase in heart rate which was similar to an individual's heart rate under stress.

*Havas, M., & Marrongelle, J. (2013). RETRACTED: Replication of heart rate variability provocation study with 2.4-GHz cordless phone confirms original findings. Electromagnetic biology and medicine, 32(2), 253-266.*



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## 2. Reduces Brain Activity in Females

- A study investigated the influence of electromagnetic fields, similar to that emitted by Wi-Fi system, on brain activity.
- Fifteen female and fifteen male subjects performed a short memory task (Wechsler test), both without and with exposure to a 2.4GHz Wi-Fi signal.
- For each subject, radiation condition and electrode, the amplitude in the frequency domain of the EEG signal was calculated from the recordings of 30 scalp electrodes, using the Fourier transform.
- The presence of radiation had no effect on the energies of alpha and beta band of male subjects, while it reduced these energies of female subjects, resulting in significantly lower energies, as compared to those of males

*Maganioti, A. E., Papageorgiou, C. C., Hountala, C. D., Kyprianou, M. A., Rabavilas, A. D., Papadimitriou, G. N., & Capsalis, C. N. (2010, October). Wi-Fi electromagnetic fields exert gender related alterations on EEG. In 6th International Workshop on Biological Effects of Electromagnetic fields.(last accessed 2014-04-01).*



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## 3. Linked to Cancer

- While human studies are rare, Wi-Fi's link to cancer was validated by the case of a 21-year-old woman, who developed a tumor, which later led to breast cancer, right at the spot where she tucked her cell phone under her sports bra.

1. <http://ehtrust.org/keep-that-cell-phone-out-of-your-bra/> (Accessed on 1 Feb 2019)

2. Çiğ, B., & Nazıroğlu, M. (2015). Investigation of the effects of distance from sources on apoptosis, oxidative stress and cytosolic calcium accumulation via TRPV1 channels induced by mobile phones and Wi-Fi in breast cancer cells. *Biochimica et Biophysica Acta (BBA)-Biomembranes*, 1848(10), 2756-2765.



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## 4. Damaging to Childhood Development

- An investigation on the effects of prenatal exposure to radiofrequency waves on postnatal development and behavior of rat offspring by exposing the experimental group to a 2.45 GHz WiFi signal for 2hrs a day throughout the gestation period.
- After delivery, the offspring was tested for physical and neurodevelopment during its 17 postnatal days.
- The study revealed that there are adverse neurological effects in the offspring by affecting neurodevelopment, cerebral stress equilibrium and cholinesterase activity.

*Othman, H., Ammari, M., Rtibi, K., Bensaid, N., Sakly, M., & Abdelmelek, H. (2017). Postnatal development and behavior effects of in-utero exposure of rats to radiofrequency waves emitted from conventional WiFi devices. Environmental toxicology and pharmacology, 52, 239-247.*



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# 5. Contributes to Insomnia

- Wi-Fi radiations can interfere with sleep patterns and cause a chronic sleep disorder.
- Reports of this phenomenon can be found in a 2007 study that evaluated low-frequency modulation from cell phones and its impact on sleep. Participants were exposed to the electromagnetic signals from real phones, or no signal from fake phones.
- Those exposed to the electromagnetic radiation had a significantly more difficult time falling asleep and changes in brainwave patterns were observed

*Hung, C. S., Anderson, C., Horne, J. A., & McEvoy, P. (2007). Mobile phone 'talk-mode' signal delays EEG-determined sleep onset. Neuroscience Letters, 421(1), 82-86.*



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## 6. Neutralizes Sperm

- In a study whose objective was evaluate the effects of laptop computers connected to local area networks wirelessly (Wi-Fi) on human spermatozoa, semen samples were collected from 29 healthy donors.
- Motile sperm were selected by swim up. Each sperm suspension was divided into two aliquots. One sperm aliquot (experimental) from each patient was exposed to an internet-connected laptop by Wi-Fi for 4 hours, whereas the second aliquot (unexposed) was used as control, incubated under identical conditions without being exposed to the laptop.
- Donor sperm samples, exposed to the wireless internet-connected laptop showed a significant decrease in progressive sperm motility and an increase in sperm DNA fragmentation.

*Avendaño C, Mata A, Sanchez Sarmiento CA, Doncel GF. Use of laptop computers connected to internet through Wi-Fi decreases human sperm motility and increases sperm DNA fragmentation. Fertil Steril. 2012 Jan;97(1):39-45.e2.*



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# Wi-Fi Pollution App



“This application gives the level of WIFI pollution around you. Looking for the most polluting sources, you can identify the sanest locations in your apartment, or protect against these sources.”



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# Stay Safe

- Switch off your phone's Wi-Fi and other routers whenever you are not using them.
- Keep cell phones away from your body: carry them in your handbags.



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"Better safe than sorry."  
Thank you



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