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مجلة ليبيا للدراسات الجغرافية
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مجلة ليبيا للدراسات الجغرافية

مجلة علمية محكمة تصدر عن الجمعية الجغرافية الليبية فرع المنطقة الوسطى

العدد الرابع يناير 2023 م

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مجلة علمية محكمة نصف سنوية
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العدد الرابع: يناير 2023م

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أعضاء الهيئة الاستشارية للمجلة:

(إِنَّ فِي خَلْقِ السَّمَاوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ وَالْفُلْكِ الَّتِي تَجْرِي فِي الْبَحْرِ بِمَا يَنفَعُ النَّاسَ وَمَا أَنزَلَ اللَّهُ مِنَ السَّمَاءِ مِن مَّاءٍ فَأَحْيَا بِهِ الْأَرْضَ بَعْدَ مَوْتِهَا وَبَثَّ فِيهَا مِن كُلِّ دَابَّةٍ وَتَصْرِيفِ الرِّيَاحِ وَالسَّحَابِ الْمُسَخَّرِ بَيْنَ السَّمَاءِ وَالْأَرْضِ لَآيَاتٍ لِّقَوْمٍ يَعْقِلُونَ)

[سورة البقرة آية 163]

شروط النشر بالمجلة

- تقبل المجلة البحوث بإحدى اللغتين العربية أو الإنجليزية.
- تنشر المجلة البحوث العلمية الأصيلة والمبتكرة .
- إقرار من الباحث بأن بحثه لم سبق نشره أو الدفع به لأية مطبوعة أخرى أو مؤتمر علمي. وأنه غير مستل من رسالة علمية (ماجستير أو دكتوراه) قام بإعدادها الباحث، وأن يتعهد الباحث بعدم إرسال بحثة إلى أية جهة أخرى.
- تقدم البحوث عن طريق البريد الالكتروني للمجلة ***Research@LFGS.LY*** على أن يلتزم الباحث بالضوابط الآتية:

1. يقدم البحث مطبوع الكترونيا بصيغة (Word) على ورق حجم (A4) وتكون هوامش الصفحة (3 سم) لجميع الاتجاهات.
2. تكتب البحوث العربية بخط (Traditional Arabic)، وبحجم (14) وتكون المسافة بين السطور (1)، وتكتب العناوين الرئيسية والفرعية بنفس الخط وبحجم (16) وبشكل غامق (Bold). أما البحوث المكتوبة باللغة الانجليزية فتكون المسافة بين السطور (1)، بخط (Time New Roman) وبحجم (12)، وتكتب العناوين الرئيسية والفرعية بنفس الخط وبحجم (14) مع (Bold).
3. يكتب عنوان البحث كاملاً واسم الباحث (الباحثين)، وجهة عمله، وعنوانه الالكتروني في الصفحة الأولى من البحث.
4. يرفق مع البحث ملخصان، باللغتين العربية والإنجليزية، بما لا يزيد على 300 كلمة لكل منهما، وأن يتبع كل ملخص كلمات مفتاحية لا تزيد عن ست كلمات.
5. يترك في كل فقرة جديدة مسافة بادئة للسطر الأول بمقدار (1سم).
6. أن لا تزيد عدد الصفحات البحث بما فيها الأشكال والرسوم والجداول والملاحق على (30) صفحة.
7. تعطى صفحات البحث بما فيه صفحات الخرائط والاشكال والملاحق أرقاماً متسلسلة في أسفل الصفحة من أول البحث إلى آخره.

8. أن تكون للبحث مقدمة واطار منهجي تثار فيه الإشكالية التي يرغب الباحث في تناولها بالدراسة والتحليل، وكذلك يحتوي على أهمية البحث وأهدافه وفروضه وحدوده والمناهج المتبعة في البحث والدراسات السابقة.
9. أن ينتهي البحث بخاتمة تتضمن أهم النتائج والتوصيات.
10. تقسم عناوين البحث كما يلي:

- العناوين الرئيسية (أولاً، ثانياً، ثالثاً،.....).
- العناوين الفرعية المنبثقة عن الرئيسية (1 ، 2 ، 3، .....).
- الاقسام الفرعية المنبثقة عن عنوان فرعي (أ، ب، ج، د،.....).
- الاقسام الفرعية المنبثقة عن فرع الفرع (أ/1، أ/2، أ3،.....).
(ب/1، ب2، ب/3،.....).

تطبق قواعد الإشارة إلى المراجع والمصادر وفقا لما يأتي:

الهوامش:

يستخدم نظام APA، ويقتضي ذلك الإشارة إلى مصدر المعلومة في المتن بين قوسين بلقب المؤلف متبوعا بالتاريخ ورقم الصفحة، مثال: (القزيري، 2007م، ص21).

قائمة المراجع:

يستوجب ترتيبها هجائياً حسب نوعية المراجع كما يلي:

الكتب:

يبدأ المرجع بالاسم الأخير للمؤلف، ثم الأسماء الأولى، سنة النشر، ثم عنوان الكتاب بخط غامق (Bold)، ثم دار النشر، مكان النشر، ثم طبعة الكتاب (لا تذكر الطبعة رقم 1 إذا كان للكتاب طبعة واحدة)، كما في الأمثلة الآتية:

- القزيري، سعد خليل، (2007)، **دراسات حضرية**، دار النهضة العربية، بيروت.

- دخيل، مفتاح علي، سيالة، انور عبدالله، (2001)، **مقدمة علم المساحة**، المكتب الجامعي الحديث، الاسكندرية.

- صفي الدين، مُحَمَّد، وآخرون، (1992)، **المـوارد الاقتصادية**، دار النهضة العربية، القاهرة.

الكتب المحررة :

إذا كان المرجع عبارة عن كتاب يضم مجموعة من الابحاث لمؤلفين مختلفين فيكتب الاسم الاخير للمؤلف متبوعاً بالأسماء الأولى، ثم سنة النشر، ثم عنوان الفصل بخط غامق (Bold)، ثم كلمة (في) ثم عنوان الكتاب، ثم اسم محرر الكتاب مع إضافة كلمة تحرير مختصرة (تح) قبله، ثم دار النشر، مكان النشر.

- العزابي، بالقاسم مُحَمَّد، **الموانئ والنقل البحري**، (1997)، في كتاب الساحل الليبي، (تح) الهادي ابولقمة و سعد القزيري، مركز البحوث والاستشارات جامعة قاريونس، بنغازي.

الدوريات العلمية والنشرات :

يذكر الاسم الاخير للمؤلف متبوعاً بالأسماء الأولى، ثم عنوان البحث بخط غامق (Bold)، ثم اسم الدورية والجهة التي تصدرها، ثم مكان النشر، رقم المجلد إن وجد، ثم رقم العدد ثم سنة النشر.

- بالحسن، عادل ابريك، **تدهور البيئة النباتية في حوض وادي الخبيري بهضبة الدفنة في ليبيا**، مجلة أبحاث، مجلة نصف سنوية تصدر عن كلية الآداب جامعة سرت، سرت، العدد (12)، سبتمبر 2018م.

الرسائل العلمية :

يذكر الاسم الاخير للمؤلف متبوعاً بالأسماء الأولى، السنة، ثم عنوان الرسالة بخط غامق (Bold)، ثم يحدد نوع الرسالة (ماجستير/دكتوراه) متبوعة بغير منشورة بين قوسين، ثم القسم والكلية واسم الجامعة والمدينة التي تقع فيها.

- جهان، مصطفى منصور، (2012)، الصناعات الغذائية في منطقة مصراتة، رسالة دكتوراه (غير منشورة)، قسم الجغرافيا، كلية الآداب، جامعة طرابلس، طرابلس.

المصادر والوثائق الحكومية:

إذ كان المرجع عبارة عن تقرير أو وثيقة حكومية فيدون الهامش على النحو التالي:-

- أمانة اللجنة الشعبية العامة للاقتصاد والتخطيط، (1984)، النتائج النهائية للتعداد العام للسكان في ليبيا سنة 1984م، مصلحة الاحصاء والتعداد، طرابلس.

المحتويات

المحتويات

الافتتاحية

الحمد لله رب العالمين، والصلاة والسلام على خاتم الانبياء والمرسلين سيدنا مُحَمَّد الهادي الأمين، وعلى آله وصحبه ومن تبعه بإحسان إلى يوم الدين،... أما بعد.

يسر هيئة تحرير مجلة ليبيا للدراسات الجغرافية أن يصدر عددها الرابع في موعده المحدد، وهي نتيجة تضافر جهود وتعاون زملائنا أعضاء هيئة التدريس في الجامعات الليبية الذين تفضلوا بتقييم البحوث وتقويمها، باعتباره واجب وطني أولاً قبل أن يكون واجب مهني.

تضمن هذا العدد ستة عشر بحثاً في فروع الجغرافيا المختلفة، كالجيمورفولوجيا، والجغرافية المناخية، وجغرافية السكان، وجغرافية المدن، وجغرافية الخدمات، وجغرافية السياحة، والجغرافية السياسية، بالإضافة إلى الاستشعار عن بعد ونظم المعلومات الجغرافية. وقد شارك في إعدادها عدد من الجغرافيين من ليبيا والمغرب واليمن.

وبهذه المناسبة، تتقدم هيئة تحرير المجلة بجزيل الشكر للسادة الباحثين المشاركين في هذا العدد، والسادة أعضاء هيئة التدريس بالجامعات الليبية على وقتهم الثمين الذي خصصوه لتقييم هذه الورقات العلمية، متمنين منهم مزيداً من العطاء والإنتاج العلمي، وتجدّد أسرة المجلّة دعوتها لكلّ الباحثين بالالتفاف حول هذا المجلة الناشئة بإسهاماتكم العلمية؛ حتى تضمن بإذن الله استمرار صدورها في موعدها المحدد.

و أخيراً.. نرجو من قرائنا الأعزَّاء، أن يلتمسوا لنا العذر في أي هفواتٍ أو أخطاء غير مقصودة، فالكمال لله وحده، ويسرنا أن نتلقَّى أرائكم، واقتراحاتكم عبر البريد الالكتروني الخاص بالمجلة، حول هذا العدد؛ بما يسهم في تحسين وتطوير المجلة شكلاً ومضموناً.

والله ولي التوفيق

أ. د. حسين مسعود أبومدينة

رئيس التحرير

سرت، 14 يناير 2023م

السيرة الذاتية للأستاذ الدكتور الهادي مصطفى أبو لقمة

مسيرة رجل رحل ولكنه لازال باقيا بإنجازاته العلمية التي نفتخر بها

تقديم: أ.د. سميرة محمد العياطي
قسم الجغرافيا/ كلية الآداب/ جامعة طرابلس

– ولِدَ الأستاذ **الدكتور الهادي مصطفى رمضان أبولقمة** في سنة 1934م بمدينة الزاوية الغربية.

– انطلقت أول مراحله الدراسية من الجامع بحفظ ما تيسر من القرآن الكريم، مع التركيز على اللغة العربية والشريعة الإسلامية، تعلّم الكتابة بطريقة صحيحة واستفاد كثيراً وتعلم ممّا كان يُعرف بالكتابة على اللوح في الجامع، فقد درس بداية أصول اللغة العربية تعلمها على يد الفقهاء علي العتري والصغير بن نصرات وعمر التمبوكتي يرحمهم الله جميعاً، في جامع أبو السباع الواقع في وسط قبيلته، والذي يبعد عن وسط مدينة الزاوية حوالى ثلاثة كيلو متر في اتجاه الشمال الغربي، وجامع الزرافة الذي يقع شرق قبيلته، ويبعد عن وسط المدينة بنفس المسافة المذكورة آنفاً غير أنه في اتجاه الشمال الشرقي.

– انتقل إلى المدرسة التي تُعرف اليوم باسم مدرسة الزاوية الابتدائية، والتي تقع في شارع النهضة أمام الكنيسة الإيطالية، وحصل على إنهاء المرحلة الأولى، أو ما كان أكثر شيوعاً بالمرحلة الابتدائية.

– انتقل إلى المرحلة الثانوية لذات المكان الذي يعرف اليوم بمدرسة الزاوية الثانوية، لكن لم تطل إقامته بهذه المدرسة طويلاً إذ سرعان ما نُقلَ الطلاب منها بسبب قلة عددهم إلى مدرسة طرابلس الثانوية، التي نال منها شهادتي الثقافة العامة والتوجيهية.

– سافر إلى القاهرة للدراسة الجامعية سنة 1953م، حيث التحق بقسم الجغرافيا بكلية الآداب جامعة القاهرة، وتحصّل على شهادة الليسانس في مجال الجغرافيا سنة 1957م.

– بعد الحصول على شهادة الليسانس صدر إعلان من وزارة التعليم في ذلك الوقت، يفيد بضرورة إيفاد خريجي الجامعات المصرية للدراسات العليا في عدد من الجامعات الأوروبية،

وكان اسمه من بين الذين قدموا أسماءهم، وفعلاً تم قبوله، وكان نصيبه السفر إلى مدينة (درهم) بالمملكة البريطانية رفقة زميلينه: الأستاذ الدكتور مختار بورو ،والأستاذ الدكتور محمود الخوجة رحمهما الله، وانتظموا في الدراسة لمرحلة الماجستير بجامعة درهم.

– أشرف عليه في مرحلة الماجستير والدكتوراه الجغرافي المعروف البرفسور (جون كلارك)، وتحصل على شهادتي الماجستير والدكتوراه من نفس الجامعة.

– تحصل على شهادة الماجستير سنة 1960م، وكانت بعنوان "**الساحل الغربي لإقليم طرابلس – دراسة في الجغرافيا البشرية**".

– أما شهادة الدكتوراه فتحمل عنوان "**مدينة بنغازي : دراسة في جغرافيا المدن**" وقد ناقشها يوم 12/ 12/ 1964م.

الوظائف الإدارية التي تقلدها:

– وكيل الجامعة الليبية (1969- 1973م).

– كان رئيس للمدينة الجامعية في بنغازي، منذ ان كان وكيلاً للجامعة الليبية سنة 1969، وتجدر الإشارة إلى أن من وضع أساس هذا الصرح هو الملك ادريس السنوسي رحمه الله يوم 6 اكتوبر 1968م، واستكمل المشروع في نهاية سنة 1973م، وتم افتتاحه أوائل شهر ابريل سنة 1974م، ويعد صرحاً علمياً لا سابق له في كل منطقة الشمال الافريقي.

– رئيس الجامعة الليبية (1973 – 1976م).

– رئيس قسم الجغرافيا بكلية الآداب بالجامعة الليبية.

– أمين الجمعية الجغرافية الليبية.

– رئيس مركز البحوث والدراسات العليا، بجامعة الزاوية.

– خبير بالهيئة القومية للبحث العلمي.

– عضو فخري بالجمعية الجغرافية الملكية البريطانية.

– عضو فخري بالاتحاد الكندي للجغرافيين.

– عضوية لجنة الأسماء الجغرافية بهيئة الأمم المتحدة ممثلاً عن ليبيا.

– عضوية اتحاد المدن العربية بجامعة الدول العربية ممثلاً عن مدينة بنغازي.

– عضوية اتحاد المدن العالمية ممثلاً عن ليبيا.

– عضو بالمجلس التنفيذي لاتحاد الجامعات الإفريقية.

– تولى رئاسة تحرير مجلة قار يونس العلمية.

– تولى رئاسة تحرير مجلة الجمعية الجغرافية الليبية.

عمل أستاذاً متعاوناً مع كل من:

– المركز الليبي للمحفوظات والدراسات التاريخية (مركز جهاد الليبيين سابقاً).

– الهيئة القومية للبحث العلمي.

– أكاديمية الدراسات العليا.

– جامعة الزاوية (السابع من أبريل سابقاً).

الانجاز العلمي:

يمكن تقسيم الانجاز العلمي للأستاذ الدكتور الهادي مصطفى أبولقمه إلى الآتي:

أولاً: التأليف:

1- دراسات ليبية جزءان.

2- مصطلحات ونصوص جغرافية.

3- السيلفيوم الثروة المفقودة.

4- من بلاد العالم.

5- الانفجار السكاني: دراسة في جغرافية السكان.

6- السكان والموارد بين الواقع وحتمية التخطيط.

7- حياة عشتها (صدر بعد وفاته رحمه الله)

ثانيًا: الترجمة:

1- مدينة طرابلس بمدخليها الغربي والشرقي في رسائل إلى الأهل.

2- ترحال في الصحراء.

3- أخبار الحملة العسكرية الأولى.

4- الأخوان بيتشي والساحل الليبي.

5- منظمة الأوبك مع آخر.

6- بنغازي عبر العصور.

7- مشروع الاستيطان اليهودي في برقة.

8- تجارة الذهب وسكان المغرب الكبير.

9- مدخل إلى الصحراء.

ثالثاً: التحرير والمشاركة:

1- الجماهيرية دراسة في الجغرافيا.

2- تحليل الواقع المكاني للسكان في الجماهيرية.

3- أزهار من قورينا.

4- الجغرافية البحرية.

5- مرزق التحضر والقاعدة الاقتصادية –مشاركة.

6- بحوث ودراسات في التاريخ الليبي –مشاركة.

7- الاستعمار الاستيطاني في ليبيا –مشاركة.

8- تقييم التعليم العالي في ليبيا 1965-1994 – مشاركة.

كتب تحت الطباعة: دراسات ليبية الجزءان الثالث والرابع.

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– مؤتمر تنظيم الجامعات في الشرق الأوسط بيروت.

– مؤتمر اتحاد الجغرافيين، كندا.

– مؤتمر حول نبات السلفيوم وآفاق استخداماته الاقتصادية والطبية عبر التاريخ، مركز الجهاد الليبي طرابلس ليبيا.

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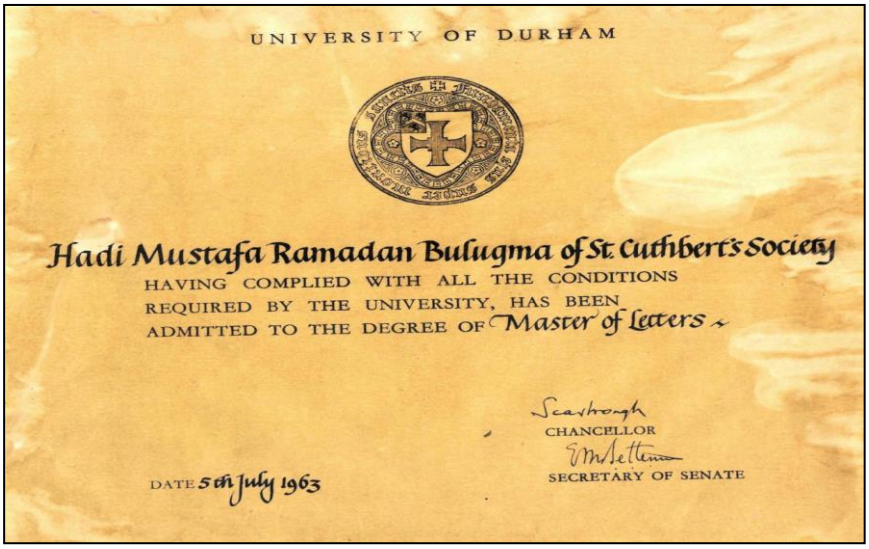
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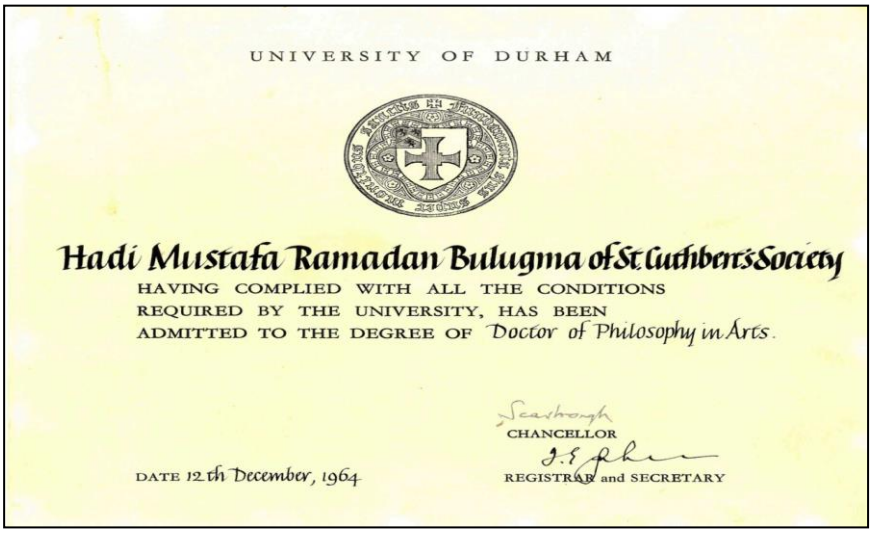
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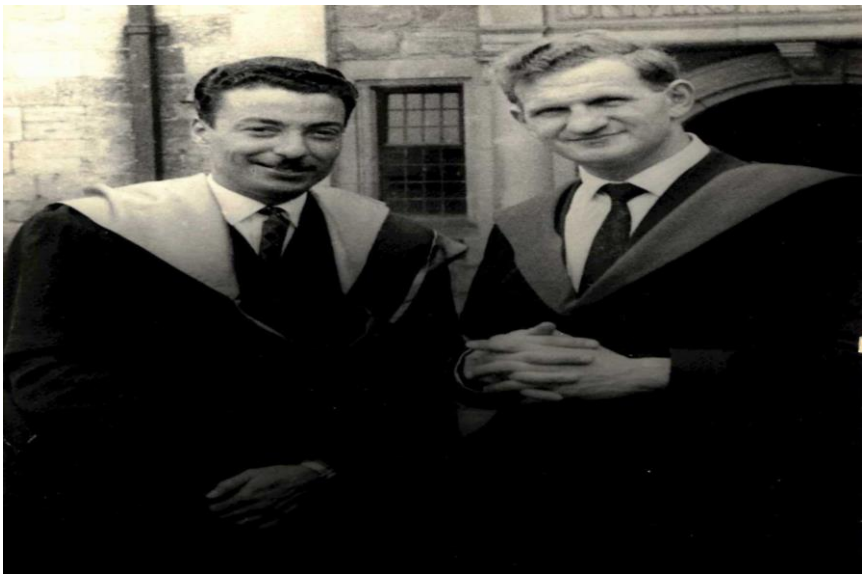

Awareness and handling of the dangers of Electronic waste (survey study)

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Abstract

Waste electrical and electronic equipment is a rapidly growing problem worldwide and can cause environmental and health problems due to its content of hazardous materials such as heavy metals and others. On the other hand, awareness and recycling of e-waste is an important issue to ensure the successful management, classification and sorting of e-waste according to international standards.

This study provides information on the knowledge, awareness and behavior of university students in dealing with, disposal, recycling and management of waste electrical and electronic equipment, as measured through a field survey in the form of an electronic questionnaire for students of the Faculty of Public Health (University of Benghazi) from the three departments: Nutrition, Environmental Health and Health Services Administration For the third and fourth years in the first months of 2022, a regular random sample of 250 students was selected from a total of 568 students. The main results of the study indicate that 60% of the sample is familiar with the concept of electrical and electronic waste. Most of the participants believe that e-waste has health and environmental risks (80.8%), and most participants would like to recycle e-waste (81.2%) and participate in the recycling program provided that the authorities establish awareness programs about the importance of treatment and recycling (53.6%) of this waste. In addition to setting up a comprehensive mechanism for collecting and sorting e-waste and then transferring it to a body designated to deal with it, imposing fines for dumping e-waste in streets and public squares, and creating awareness through workshops and media awareness about the dangers of e-waste and how to treat it.

Keywords: E-waste, awareness, risk, management, knowledge.

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التوعية بمخاطر النفايات الإلكترونية وكيفية التعامل معها (دراسة استقصائية)

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المخلص

تعد نفايات المعدات الكهربائية والإلكترونية مشكلة سريعة النمو في جميع أنحاء العالم، ويمكن أن تسبب مشاكل بيئية وصحية بسبب محتواها من المواد الخطرة مثل المعادن الثقيلة وغيرها. من ناحية أخرى يعد الوعي وإعادة تدوير النفايات الإلكترونية قضية مهمة لضمان نجاح إدارة المخلفات الإلكترونية وتصنيفها وفرزها وفقًا للمعايير الدولية.

وتقدم هذه الدراسة معلومات عن معرفة ووعي وسلوك طلاب الجامعة في التعامل مع نفايات المعدات الكهربائية والإلكترونية والتخلص منها وإعادة تدويرها وإدارتها، مقاسة من خلال مسح ميداني على شكل استبيان إلكتروني لطلاب كلية الصحة العامة (جامعة بنغازي) من الأقسام الثلاثة: التغذية وصحة البيئة وإدارة الخدمات الصحية للسنتين الثالثة والرابعة في الأشهر الأولى من عام 2022 وتم اختيار عينة عشوائية منتظمة قوامها 250 طالبًا من إجمالي 568 والنتائج الرئيسية من الدراسة تشير إلى أن نسبة (60٪) من العينة على دراية بمفهوم النفايات الكهربائية والإلكترونية. ويعتقد معظم المبحوثين أن النفايات الإلكترونية لها مخاطر صحية وبيئية بنسبة (80.8٪)، ونسبة (81.2٪) يودون المشاركة في برنامج إعادة التدوير بشرط أن تضع السلطات برامج توعية حول أهمية المعالجة وإعادة التدوير (53.6٪) من هذه النفايات. بالإضافة إلى وضع آلية شاملة لجمع وفرز النفايات الإلكترونية ومن ثم نقلها إلى جهة مخصصة للتعامل معها وفرض غرامات إلقاء النفايات الإلكترونية في الشوارع والساحات العامة وخلق الوعي من خلال ورش العمل والتوعية الإعلامية حول مخاطر المخلفات الإلكترونية وكيفية معالجتها.

الكلمات المفتاحية: النفايات الالكترونية، التوعية، المخاطر، الإدارة، المعرفة.

1. Introduction

The e-waste has become the foremost rapidly growing segment of the traditional municipal waste stream within the world. The e-waste contains a hazardous constituent that will negatively impact the environment and affect human health if not properly managed. Due to the lack of an adequate infrastructure to manage wastes safely, these wastes are buried, burnt within the outdoors, or dumped into surface water. E-waste poses the foremost direct health risks when it degrades and therefore the internal chemicals are released into the environment, Electrical and Electronics Equipment are made from multiple components these toxic substances may have a direct impact on human health and also the environment if they're not handled properly (Shalini, 2013). Per annum, 20 to 50 million tons of E-waste are discarded and are estimated to be growing at 3–5 % per annum. (Abbas, 2018)

Although e-waste generation in developing countries amounted to only 0.01–1% of the total local solid waste generation (Sharp, 2017).

1.1. What's E-waste?

Organisms from them consistent with the Basel Convention, (1997), waste is defined as "substances or objects which are disposed or are intended to be disposed or are required to be disposed of by the supply of national law(Abbas, 2018).

Defined waste as anything that's no longer privately valued by its owner or has reached its end-of-life (EOL). Electronic waste, or "E-waste", is, therefore, the EOL of electronic products. Consistent with UNEP, (2010) E-waste comprises the products that are retired from use or discarded. E-waste could be understood as unusable and or unworkable or unwanted electronic or electric and electronic appliances became obsolete stuff and need to be disposed of, either within the Sorts of whole or as parts In other words, "E-waste" is electric and electronic equipment (EEE) and products that are broken, obsolete, discarded, or have reached the end of their useful life (Abbas, 2018).

1.2. Global e-waste key statistics

In 2019, global e-waste generation 53.6 Mt (7.3 Kg per capita), the formal documented collection and recycling were 9.3 Mt, thus 17.4% compared to e- waste generated. It grew by 1.8 Mt since 2014, an annual growth of just about 0.4 Mt. However, the entire

e-waste generation increased by 9.2 Mt, with an annual growth of just about 2 Mt. Reports indicate that the fate of 82.6% (44.3 million tons) of e-waste generated in 2019 is unknown, and it is distributed over different places, and this has a significant impact on the environment and includes different and wide areas (Balde, 2017).

The infrastructure needed to recycle e-waste is being developed in high-income countries, and in this way, 8% of e-waste is disposed of in waste containers after which it is either incinerated or landfilled. This is often mostly composed of small equipment and small IT. Often discarded products are reclaimed or reused and shipped to low-income countries for reuse. However, a considerable amount of e-waste remains exported illegally or under the guise of being for reuse or pretending to be rubbish. E-waste and used electronic and electrical devices that move across borders range from 7% to 20% of the waste generated. Middle- and low-income countries face challenges in developing the infrastructure to try to fully or partially manage e-waste, but these attempts always fail. Therefore, most of the e-waste management activities in these countries are carried out by the informal sector. During this case, e-waste is typically handled under inferior conditions, causing severe health effects to workers also on the youngsters who often live, work and play near e-waste management activities (Balde, 2017).

1.3. E-waste and the Sustainable Development Goals (SDGs)

E-waste data contribute to the Sustainable Development Goals that were adopted in September 2015 and adopted by the United Nations and all Member States, which is the ambitious 2030 Agenda for Sustainable Development and sets 17 Sustainable Development Goals (SDGs) and 169 goals to end poverty, protect the planet and ensure prosperity for all. Over the past 15 years, one of the biggest challenges to the environment and human health that stand in the way of achieving the sustainable development goals is the increase in the levels of electronic waste, improper and unsafe treatment and disposal through incineration or in landfills.

E-waste management is closely linked to many of the main sustainable development goals, as it is linked to 6 out of 17 main

goals and is also linked to many sub-goals of sustainable development.

- Goal (3) good health and well-being.
- Goal (6) clean water and sanitation.
- Goal (14) life below water.
- Target (3.9) states to scale back deaths and diseases caused by hazardous chemicals that pollute the air, soil, and water.
- Target (6.1) seeks to realize universal and equitable access to safe and affordable beverages for all.
- Target (6.3) aims to scale back pollution, eliminating dumping, and reduce the discharge of chemicals.
- Target 14 refers to marine pollution and therefore the protection of the marine ecosystem through (targets 14.1 and 14.2).
- Goal (11) sustainable cities and communities.
- Goal (12) responsible consumption and production.
- Goal (8) decent work and economic growth.
- Target (11.6) aims to scale back the per capita harmful environmental impact of cities by that specializes in air quality, municipal waste management.
- Goal (12.4) aims to realize the environmentally sound management of chemicals and everyone wastes throughout the life cycle and to scale back their release into the air, soil, and water to scale back their negative effects on human health and therefore the environment.
- Target (12.5) aims to significantly reduce waste generation through the prevention, reduction, repair, recycling, and reuse. An increasing number of individuals on this planet are consuming increasing amounts of products, and it's critical to form production and consumption more sustainable through Raising awareness levels of producers and consumers, particularly within the field of electrical and electronic equipment.
- Goal (3.8) of the Sustainable Development Goals aims to market development- oriented policies that support productive activities, decent job creation, entrepreneurship, creativity, and innovation, and encourage the formalization and growth of micro, small and medium enterprises.
- Target (8.8) involves the protection of workers' rights and promotes safe and secure work environments for all workers.

Proper management of e-waste can create new job opportunities and contribute to economic growth within the recycling and regeneration sector(Forti, 2020).

- International reports indicate that the production of electronic waste in Libya amounted to 76 kilotons for the year 2019, at a rate of 11.5 kg per capita, and there is insufficient information about recycling activities in the country, as well as there, are no laws to regulate recycling and safe collection and disposal of electronic waste, The precious raw materials that are lost with electronic waste globally are estimated at 55 billion euros annually (Balde, 2017).

1.4. Sources of electronic waste:

The sources of electronic waste can be listed in the following points:

1. Residue or leftover materials from the electronic products manufacturing process.
2. Leftover parts or materials or discarded electrical and equipment generated from a fix-it shop.
3. Obsolete electrical and equipment coming from governments, companies, and other facilities.
4. Obsolete electrical and electronic products mainly from households (Shalini,2013).

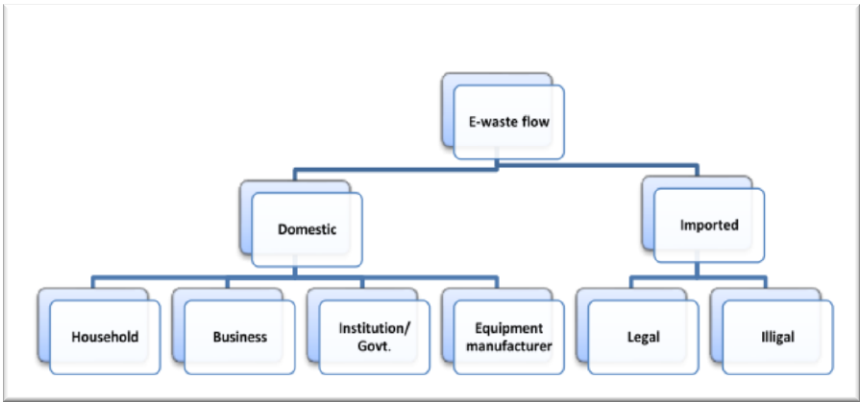


Figure 1 Diagram-DA- Sources of E-waste of Kolkata (7)

1.5. The classification of E-waste:

Wastes are classified, to facilitate the method of management. The three systems of classifying waste are based on level of toxicity and risk, chemical composition, and source of generation.

The first system divides waste into two groups of hazardous and non-hazardous waste; the 2nd classifies waste into inorganic or organic/microbiological waste; and the 3rd categorizes waste into municipal, industrial, medical, agricultural, commercial, and construction and demolition waste. On the idea of their types and utility, identified EEE into three groups: white, brown, and gray goods.

1.6. Types of e-waste:

It covers six waste categories:

1. Temperature exchange equipment, more commonly mentioned as cooling and freezing equipment. Typical equipment includes refrigerators, freezers, air conditioners, heat pumps.
2. Screens, monitors. Typical equipment includes televisions, monitors, laptops, notebooks, and tablets.
3. Lamps, typical equipment includes fluorescent lamps, high-intensity discharge lamps, and LED lamps.
4. Large equipment. Typical equipment includes washing machines, clothes dryers, dish-washing machines, electric stoves, large printing machines, copying equipment, and photovoltaic panels.
5. Small equipment. Typical equipment includes vacuum cleaners, microwaves, ventilation equipment, toasters, electric kettles, electric shavers, scales, calculators, radio sets, video cameras, electrical and electronic toys, small electrical and electronic tools, small medical devices, small monitoring and control instruments.
6. Small IT and telecommunication system. Typical equipment includes mobile phones, Global Positioning Systems (GPS), pocket calculators, routers, personal computers, printers, telephones.

Each product of the six e-waste categories features a different lifetime profile, which means that every category has different waste quantities, economic values, also as potential environmental and health impacts, if recycled inappropriately. Consequently, the collection and logistical processes and recycling technology differ for every category, within the same way because the consumers' attitudes when removing the electrical and electronic equipment also vary (Forti, 2017).

1.7. Components of the composition of electronic waste:

Electronic waste is a complex and heterogeneous mixture of waste, containing several types of products, components, and intertwined materials. Electronic waste contains many hazardous materials such as heavy metals and bromine flame retardants, on the other hand, it also contains materials of strategic value such as precious metals Such as gold, silver, copper, aluminum, lead, and iron. The most electronic waste consists of 80% plastic and glass, while valuable and toxic materials are found in smaller quantities, but they are of high importance (Abbas,2018).

1.8. Hazards of e-waste:

Waste impacts manifest themselves in various ways such as the potential for lost economic opportunities, direct impact on human health, impairment of individual productivity, and damage to ecosystems such as loss of biodiversity. E-waste is considered more dangerous than other municipal waste, as it is a diverse mixture of different types of toxic elements capable of causing an irreversible impact on the environment and human health if it is handled incorrectly. Reports have indicated that the Cd^{+2} contained in a single cell phone battery is enough to pollute $600m^3$ of water (Abbas,2018).

1.8.1 Adverse health effects:

Recently, research has found that unregulated e-waste recycling is associated with increasing numbers of adverse health effects (Forti,2020), including diseases and problems related to the skin, stomach, respiratory tract and other organs. Workers suffer high incidences of birth defects, infant mortality, tuberculosis, blood diseases, anomalies in the immune system, malfunctioning of the kidneys and respiratory system, lung cancer, underdevelopment of the brain in children and damage to the nervous and blood systems. Long-term health studies of e- waste workers have yet to be conducted. Long-range transport of pollutants has also been observed, which suggests a risk of secondary exposure in remote areas(OIT,2012).

1.8.2 The E-waste has large effect on environment include (Air, Water, Soil, etc.):

i. Hazards of E-waste on air:

Many E-waste contaminants are spread into the air via dust. This is a major exposure pathway for humans through ingestion, inhalation and skin absorption. Examples of E-waste aerial contamination are: PBDEs, polychlorodibenzo-p- dioxins, particulate (PAHs), Cr^{+6}, Cu^{+2} And Zn^{+2}. Dust collected from E-waste recycling workshops had Pb^{+4}, Cu^{+2} and Zn^{+2} concentration some fivefold higher than road dust, reported that E-waste workers in India breathe dust laden air containing Cd^{+2}, In^{+3}, Sn^{+4}, Sb^{+3}, Pb^{+4} Hg^{+2},and Bi^{+5}(Abbas, 2018).

ii. Hazards of E-waste on water and aquatic systems:

Many case studies from E-waste recycling plants confirmed that the toxic chemicals such as heavy metals and POPs have and continue to contaminate the surrounding environment. Aquatic organisms may absorb heavy metal pollutants directly from water or indirectly via uptake from the food chain. E-waste contaminants have the potential to produce deleterious effects on the behavior, physiology, metabolism, reproduction, development and growth of many aquatic organisms. *** Lean, (2004) has reported that Cd^{+2} from one cellular phone battery are enough to pollute $600m^3$ of water** Accumulation of hazardous substances into the ecosystem can adversely impact human health. E- Waste contaminants can enter aquatic systems via leaching from dump sites where processed or unprocessed E-waste may have been deposited. Study by and., revealed bioaccumulation of PBDEs in water snake and carps. PBDEs have endocrine disrupting properties. Demonstrated the toxicity of chemical such as Cr^{+2}, As^{+3}, and Pb^{+4} in aquatic organisms. Landfilling of the E-waste may also contaminate the underground water and so the aquatic systems (Abbas, 2018).

iii. Hazards of E-waste on soil and terrestrial environments:

Environmental scientists found that soil in the E-waste areas are often contaminated by heavy metals and organic compounds. These non- biodegradable pollutants contaminate agricultural soil and water thereby gets into the food chain through the crops. Some

report show uptake of PBDEs in leaves of sorghum, Japanese dock and Eastern daisy fleabane. Also analysis of China, revealed increased concentrations of Pb^{+4} and Cd^{+2}, and reduction in germination rate of rice. Elevated levels of PBDEs in chicken tissues and transfer of E-waste derived PCBs to ground and surface waters, agricultural soil, rice, eggs, fish and ultimately humans has been demonstrated to conclude that these toxins may pose a threat to humans and ecosystems. Although Antoniadis et al., (2017) argued that many plants have defense mechanisms against excess uptake of pollutants, Wang et al., (2016) reported that pollutants in E-waste may critically damage the roots and impair the defense mechanisms, leading to indiscriminate uptake of pollutants. Consequently, the edible part of plants may be seriously contaminated with pollutants. A micronuclei assay using Vicia faba, indicated promotion of DNA damage. Concluded that E-waste is a potential source of genetic mutation and may induce cytogenetic damage within the general population exposed to E-waste pollution rice samples from E-waste processing town in Eastern (Abbas, 2018).

Table 1 Hazards of some heavy metals (11)

contaminant	Neuropsychological function affected and caused	How they are exposed
Lead	Cognition (verbal and performance), fine and gross motor skills, memory, attention, executive function, academic achievement, hyperactivity, delinquent behavior.	Air, dust, water, soil, leaded paint or gasoline
Mercury	Cognition, Language, motor function, attention	Air, seafood, mercury vapor
cadmium	cognition	Air, dust, food (rice, vegetables), tobacco smoke
PBDE (polybrominated Diphenyl Ether)	cognition	Air, dust, food

1.9. E-waste management and recycling and disposal methods.

E-waste is generated from several sources which include industries, institutions, and households. Several electronic devices have very shorter life spans and are frequently changed, thus resulting in increased waste generation rates. (Rampedi, 2020).

The equivalent between E-waste and other municipal waste disposal methods but the presence of hazardous materials in E-

waste makes it essential to be disposed of separately paying concern to the environment. Storage is that the initiative within the E-waste disposal chain. There are four general fates for electronic products at them:

i. Reuse: products are refurbished for resale, given away for free of charge (direct second user use), or stripped of functioning components that are then remanufactured.

ii. Recycling: products are dismantled and shredded for the recovery of raw materials.

iii. Disposal products are either sent to landfills (replete with all the risks of leaching) or are incinerated (releases heavy metals like Pb, Cd, and Hg into the atmosphere).

iv. Storage: products are stored away during a workshop or closet.

- **And can be categorized into:-**

1 / Thermal treatment disposal: it's in sort of heat and is employed to treat and decompose waste through:

i/ Open burning: It refers to burning of waste in open pits, barrels, fireplaces during which emissions are directly released into the ambient air. This method is practiced at a really small level for household and industrial waste disposal.

ii/ Incineration it's a way of disposing of waste by burning: Incineration usually functions as an alternative to other disposal methods, especially landfilling. Incineration can reduce the general volume of the waste stream and, especially for hazardous waste; the warmth emitted is often productively wont to generate energy. Since metals won't combust, incineration isn't an efficient method for treating metal bearing hazardous wastes, Moreover, if the waste isn't sorted or segregated before incineration, the output from the combustion process is usually toxic stack emissions and residual ash containing heavy metals, which require a secondary sort of disposal.

2/ Dumping disposal: This method is used for the giant-scale disposal of waste. Toxic chemicals in E-waste can leach into the land over time or release into the atmosphere, impacting nearby communities and therefore the environment. Where there's no separate collection and recycling system for E-waste landfill is extremely common and is completed through.

i/ Open dumps: this is often the most cost-effective quite disposal during which waste is dumped in low lying areas on the town outskirts and continuously leveled by bulldozers. It's not a scientific way of dumping and isn't emphasized.
ii/ Conventional Landfill dumping: In unused areas, mining voids or craters, trenches of required depth and area are developed to dump waste. A layer of soil or debris is scattered over the landfill on a routine basis to stop atmospheric contamination. After the landfill trench is filled, the world is roofed with a thick layer of mud and therefore the site is often used for the construction of some parking zone or park. Leaching of the hazardous material within the waste may be a concern in such quiet landfills.
iii/ Sanitary Landfill dumping: it's a contemporary landfill that solves the matter of leaching to an outsized extent. Protective measures against the spreading of pollution within the form lining of bricks or cement make leaching impermeable. Also, extraction pipes are wont to pump out the leached hazardous materials within the water and expel out exhaust gasses (Abbas, 2018).

2. Literature Review

In 2012, Fraige, al-khatib, et al contributed to the preparation of the study Waste electric and electronic equipment in Jordan: willingness and generation rates.

Attempted to measure levels of awareness of household electrical and electronic waste, consumption patterns, and some other aspects using questionnaires and interview methods. A random sample was taken from Jordanian families. The questionnaire consisted of 8 axes and covered all Jordanian cities. 1862 questionnaires were conducted out of about one million Jordanian families. The results showed that more than half of them know the term WEEE, but do not know how to deal with it. It has been proven that waste separation in generation sources is much easier and more cost-effective compared to the later stages. The majority of families believed that the government and the manufacturing company should bear the cost of recycling waste electrical and electronic equipment, and a minority of them could pay for recycling waste an amount of approximately $7 per piece (Fraige, 2012).

Published a study entitled An Assessment of Public Awareness Regarding E- Waste Hazards and Management Strategies, in 2014, Shah et al. participated in this study. This study revealed the huge volume of electronic waste and the need to find a mechanism to manage it, as this waste contains highly toxic chemicals that complicate the waste treatment process and can harm human health and the environment. India recently implemented some regulations to address this problem through the Ministry of Environment and Forests This study attempts to assess the situation of electronic waste through personal interviews with Indian families in Ahmedabad, the largest city in Gujarat. Interviews were also conducted with government officials, representatives of non-governmental organizations, and formal and informal workers in e-waste treatment. 65 questionnaires were distributed to families, personal interviews were conducted, and snowball technique was used to collect information. It was found that most respondents do not participate in formal e- waste recycling systems and do not know specific details about the health and environmental risks of e-waste. And they don't know about the e-waste legislation of 2011 ,In addition, only a quarter of them admit that raw materials and spare components can be extracted from unused electronics. The data indicated that there is no government incentive for consumers to participate in the official e-waste management strategies(Shah, 2014).

Kwatra, Pandey, et al, published a 2014 paper under the title Understanding public knowledge and awareness on e-waste in an urban setting in India a case study for Delhi. In it, they found it important to understand the levels of knowledge and awareness of consumers of electronic products, who eventually become producers of electronic waste in society. This study is based on a survey conducted to understand people's perception about the emergence and management of issues related to e-waste, The main purpose of this paper is to study findings that can help design customized educational programs to address this concern more effectively. Therefore, a random survey was conducted that included 400 middle-class people belonging to different educational backgrounds and professions to understand the general knowledge and awareness of the subject. The personal interview method was used to collect data and a two-part questionnaire was

developed, the questionnaire consists of open and closed questions. The results show that a large percentage of the middle class is still unaware of this problem, and after obtaining the information, they were able to link the effects of improper management of electronic waste with harmful health outcomes. Most respondents were not fully aware of the correct ways to recycle and manage it, The results also showed that nearly a quarter of the participants have replaced major electronic goods such as refrigerators, food processors, and personal computers during the first three years of their purchase, and the disposal of electronic products during their useful life leads to an increase in the generation of electronic waste. Respondents adequately placed equal responsibility on the shoulders of government, consumers, and producers for the effective management of electronic waste(Pandey, 2014).

A sendiente-Bajao, et al. also did a study under the title Electronic Waste Awareness and Management in the Municipality of Tuburan, Cebu, Philippines, and Published in 2016, this study assessed electronic waste in the municipality of Tuburan Cebu. Questionnaires were distributed to more than 13 areas in the municipality with simple questions answered with yes or no, there were 1115 respondents (families) sampling was done in a selective way or appropriate sampling, it showed that more than Half of the respondents still need full awareness about electronic waste, its composition and proper handling, and its impact on the environment. More than 50% of the respondents said that they would end up disposing of electronic waste anywhere or in an open landfill because there are no waste collectors in their areas (Bajao, 2016).

Azodo Ogban contributed to a study entitled Knowledge and Awareness Implication on E-Waste Management among Nigerian Collegiate in 2017.

The study showed that the lack of awareness and exemplary information about effective and applicable operation processes associated with e-waste may pose implicit trouble to mortal health and the environment. This study assesses knowledge and counteraccusations for mindfulness of e-waste operation among a class of undergraduate students at Federal University Wukari,

Taraba State, Nigeria. The questionnaire was used to conduct a cross-sectional survey of the study sample. The designed questionnaire was divided into four sections ، Electronic devices have numerous benefits, but once they reach EoL, they pose significant trouble and peril to mortal health, the environment, livestock, and ecosystems if not handled duly. The results showed that students' proprietorship and use of electronic devices was high and they were relatively familiar withe- waste treatment processes, which indicates a medium position of applicable operation practices for it (Azodo, 2017).

Kangyang, Isaac, et al ،In 2019, conducting a study entitled Survey on Household Awareness and Willingness to Participate in E-Waste Management in Jos, Plateau State, Nigeria. In it, they revealed that 290,000 tons of electronic waste were produced in Nigeria in 2017, and it is likely to increase globally due to high population growth rates, rapid urbanization and high demand for electronic products. A survey was conducted that examined the levels of awareness and knowledge among families in Jos, Plateau State, Nigeria, in which 228 respondents were interviewed by means of closed questionnaires and the participants were randomly selected.The results showed that most of the respondents own mobile phones or televisions, and the main reasons for obtaining these electronic devices included replacing damaged devices and frequent upgrades to products, as well as theft. The results showed that most of the respondents expressed their willingness to participate in its management, provided that they are provided with appropriate knowledge regarding safe disposal and recycling .The results also showed that there was no significant correlation between the levels of awareness of e-waste and the willingness to participate in its management based on the personal, social and demographic profile of the respondents (Isaac, 2019).

In the Iraqi city of Mosul, Shihab, Ismail, et al. By studying its title ESTIMATION AND ANALYSIS OF ELECTRONIC WASTE, Published in the year 2020. The study includes the composition of electronic waste, its generation rate and its relationship to some characteristics of the source of construction. A questionnaire was prepared to collect data, conducted through

57 visits. The questionnaire includes characteristics of specific families. These characteristics are the number of family members, family income, and educational level of the head of the family. The results showed that screens and televisions represent the highest percentage among the other types according to weight, and that the educational level of the head of the family had the highest effect on the variation in the rate of electronic waste generation, as well as the number of family members. It turned out that they dispose of electronic waste with municipal waste (Shihab, 2020).

A research team including Islam, Dias et al conducted a study entitled Young consumers' e-waste awareness, consumption, disposal, and recycling behavior.

Considered as a case study of university students in Sydney, Australia in 2021, Young consumers' awareness and awareness of WEEE disposal patterns were measured using a questionnaire in Sydney, Australia. This is the first systematic study on the knowledge and awareness of young consumers about e- waste to be conducted in Australia, The consumption and recycling behaviors were analyzed through statistical analysis, Focusing on the educated younger generation in an urban environment, descriptive analysis was conducted along with statistical analysis to determine the types of association between variables, such as reasons for equipment disposal, storage (storage), and disposal behavior. The life span of electrical and electronic equipment (EEE), when owned by young consumers, has also been investigated. The results of the study indicate that although consumers were aware of what e-waste (e-waste) is, there is an acute lack of knowledge regarding collection points and current recycling programs. It turns out that most respondents tend to dispose of proper e-waste, indicating that awareness programs are necessary to avoid improper disposal of WEEE. Most of the reasons for disposal and frequency of purchase of new products were positively correlated with household income, The average age of tenure (in years) across our respondents was 6.21 for TVs, 4.31 for laptops, and 5.47 for desktops. Strong evidence was found of a significant association between age, income, the number of family members in the respondents' household, and recycling behaviors (Islam , 2021).

3. Importance and Aim of the Study

3.1 Importance the Study:

E-waste is a global problem and has environmental and health dimensions unless it is properly exploited, recycled and realized its economic benefits. This study is one of the few important scientific studies in Libya to measure awareness of such waste.

3.2 Aim of the Study:

1. Educating people about the dangers of e-waste and how to deal with it.
2. Reducing the import of used and worn out products from abroad.
3. Safe disposal of e-waste.
4. .Identify negative impacts on the environment (air, water, soil).

4. Methodology

4.1 Methodology and tools used:

The study relied on the descriptive approach by describing electronic waste that its accumulation causes health problems case study. To raise public health students' awareness of the side effects of improper electronic and electrical waste disposal. A quantitative approach was used to describe, display, and analyze data obtained through a prepared questionnaire .

The questionnaire has been published electronically and is designed using (Google forms).The data were statistically analyzed using SPSS version 25

4.2 Sources and methods of data preparation and quantitative analysis:

4.2.1 Data collection stage:

The stage of collecting the apparent data to be studied included from a variety of sources. The most important sources that were relied on were:

- **Main Sources "direct":**

This stage included the analysis of the questionnaire data that was applied as one of the most important tools of the scientific study by selecting the sample. The following is an overview of the sample:

❖ **Sample society:**

A regular random sample was selected from a total of 568 students in the third and fourth years of the Faculty of Public Health in the three departments: nutrition, environmental health and the Department of Health Services for the year 2022. 250 students were selected and the sample ratio was determined based on the Krejcia schedule and 1970 Morgan.

❖ **Questionnaire form:**

The distribution of the questionnaire in the period from 20\1\2022 to 10\2\2022 was designed and distributed electronically because of the condition of the pandemic coronavirus on student groups for the third and fourth years of the section that have been mentioned previously.

The extent of confidentiality of this information and its importance in the study and the possibility of benefiting from it in scientific and practical studies were also clarified.

The questionnaire covered several aspects, mainly health, environmental and economic, and included important points as well as questions relating to the study and how they related to previous factors that had influenced the subject matter of the study.

❖ **Secondary "indirect" sources:**

This included various references in books, periodicals, papers, and scholarly letters.

4.2.2 Stage of classification, tabulation, and presentation of data:

Information was collected from statistical forms (questionnaire form) and placed in a special form known as the Master Sheet where each variable was given its own code.

This stage includes ways to unload information using methods and models (tables, graphs, graphic figures...) that clearly and simply reflect the subject of study.

4.2.3 Stage of data analysis:

This stage included variables that affected each other in the form of overlapping relationships, and therefore the analysis was done by statistical measures and quantitative methods appropriate to the data, which is a chi- square.

5.Results and discussion

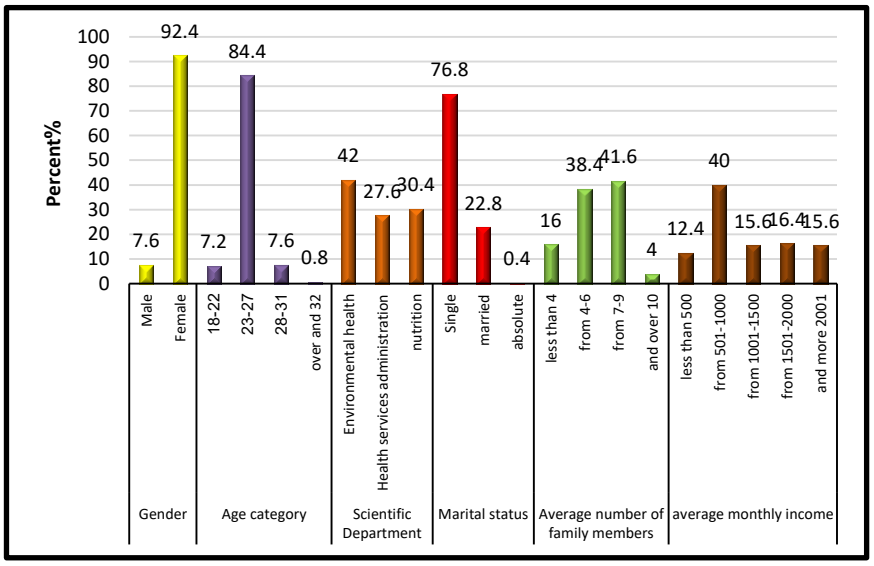


***Figure 2** Demographic characteristics of the study participants*

Figure 2 show that the proportion of males was 7.6, and the proportion of females was 92.4%, which is the largest in the study sample.

The age groups most involved in the survey were mid-twenties (27-23), 84.4%. This is normal according to the sample. The average age of the students participating in the survey was 25.05 years. This corresponds to the average age of respondents in an Australian study, which was 25.87 years (Shihab, 2020). Shows the percentage of participants based on social status. The majority of participants were single with a rate of 76.8%, followed by married people with a rate of 22.8%. A similar study was conducted in India, in which the marital status of the participants was mostly married where they formed 86% (Sivathanu, 2016). Shows student ratios by scientific section. The results showed a similar ratio. 30.4%, respectively.

The average number of family members participating and the two most important girls (7-9) were 41.6% and 38.4%, respectively (Abbas,2018) In agreement with the results of a study in Sudan, which showed similarities in the number of family members of participants. The ratio of family members per family

was 5.77 according to our study participants and was close to the average for Jordanian households (5.94), as well as with the average number of family members in Sudan (5) members per family (Fraige, 2012).

Note that the majority of participants with average incomes of 501- 1000 and 1501-2000 were 40. 16.4%. The income was calculated in dollars at the central bank rate ($108 - $217) lei ($1 = 4.6 lire) and the largest arc was equal to the average income ($210.88) for the family. The income structure of the participants corresponds to that of the participants in a study in Nigeria (Miner, 2020). *(LYD= Libyan dinar)

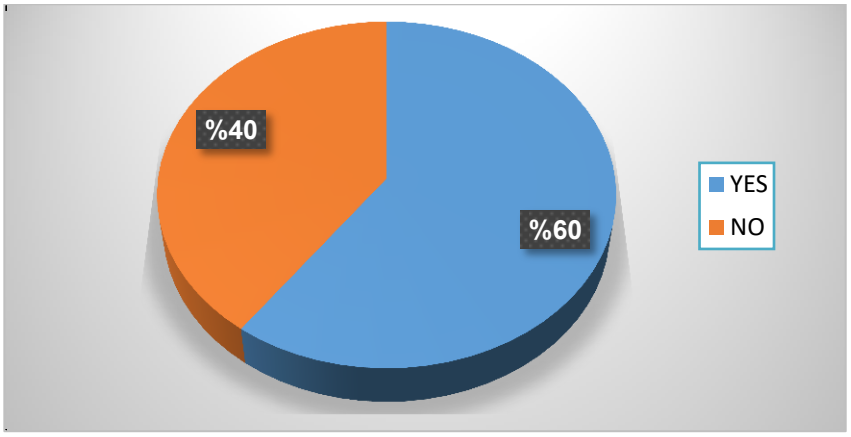


***Figure 3** awareness about e-waste*

Shows how well do participants know what is electrical and electronic waste and it turns out the majority have 60%. Knowing. Compared to a study in the Kingdom of Hashemite jordan the results matching our study were 60% (Fraige,2012). In addition, a study showed. India that big Tarba in with the study results by 58.5% (Sivathanu,2016).

***Table 2** The rate of use of electronic devices*

	Yes		NO	
Do you frequently use electronic devices?	NO	%	NO.	%
	231	92.4 %	19	7.6 %

Shows that the majority of participants use electronic devices frequently, and their percentage is 92.4%, while the rest of the participants used less by 7.6%. In a study conducted by Anuj Shah, where the behavior of the participants is consistent with the behavior of the people who participated in our study that they use electronic devices frequently and form 85% (Shah, 2014).

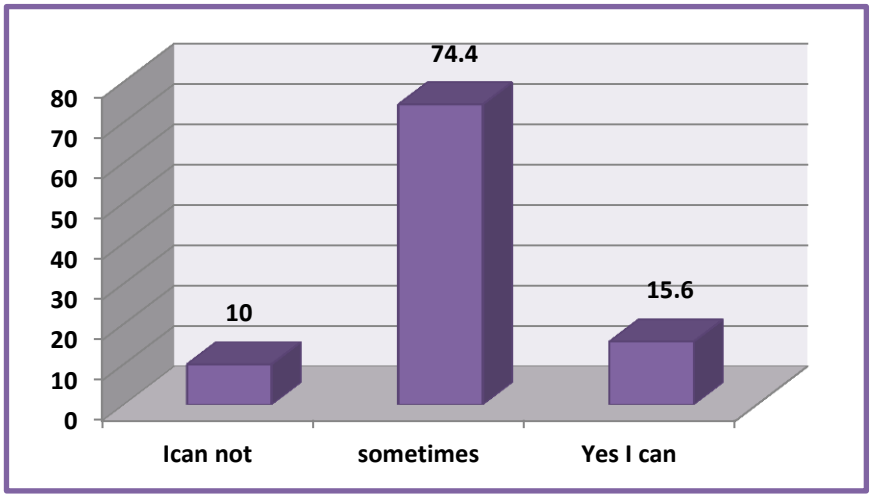


***Figure 4** Ability to purchase good quality equipment*

Shows that the majority of the participants had the ability sometimes to buy good electronic devices, by 74.4%, and by 10%, they were not able to buy good electronic devices.

***Table 3** Evaluation of existing devices in the market, according to respondents*

What do you think of the electronic devices and equipment offered in the market?	No.	%
Lower quality and cheaper	7	2.8 %
expensive	112	44.8 %
New	31	12.4 %
Used	5	2 %
all mentioned	95	38 %
Total	**250**	**100 %**

From Table 3 we can see that the majority of participants (44.8%) confirmed that the equipment on the market was expensive, while opinions differed between what was said, new, and lower quality

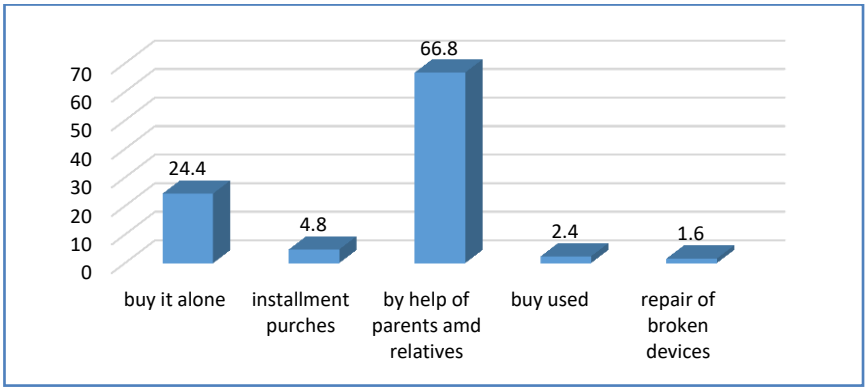


***Figure 5** ways to obtain electronic devices and equipment*

Figure 5 shows the ways of obtaining electronic devices and equipment, as it appeared that the majority of subscribers obtain them with the help of parents and relatives, at 66.8%, and the percentage of those who pay their value alone is only 24.4%

***Table 4** Quality of products purchased by participants*

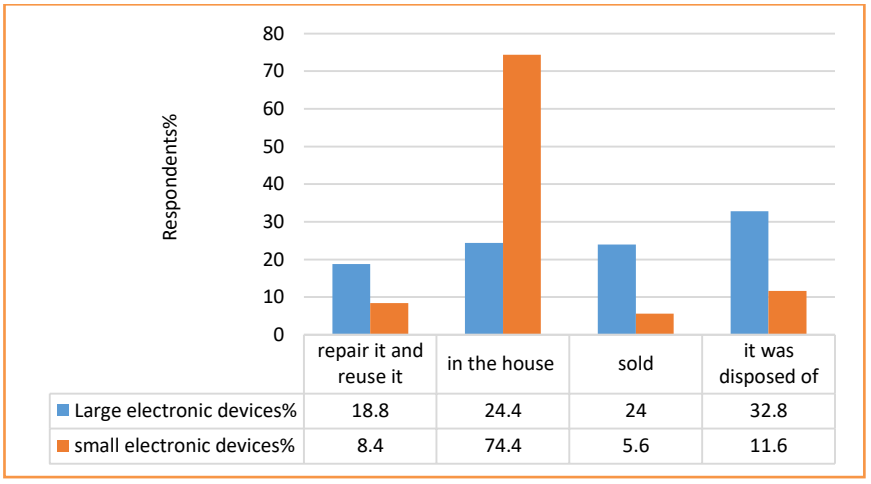
Buy electrical/electronic tools with brands that are famous for their strength and longer life compared to other brands?	No.	%
always	127	50.8 %
Sometimes	110	44 %
rarely	13	5.2 %
Total	**250**	**100 %**

Table 4 shows that the participants who always buy electrical and electronic devices of well-known brands for their strength and longer life compared to other brands, their percentage was 50.8%, while 44% of them buy them sometimes. When comparing the results with a similar study conducted in Nigeria, a discrepancy was observed in the participants' behaviors and the number of practitioners of this behavior was very low (Azodo, 2017).

***Table 5** The most common type of devices that respondents use*

The most used electronic devices and equipment that you use?	No.	%
Heating and cooling equipment(refrigerators -air conditioners -freezers)	74	29.6
Monitors (TVs, computers, tablets)	37	14.8
Lamps (fluorescent lamps - LED lamps- headlights)	8	3.2
Large equipment (washing machines -electric oven-large printing machines)	17	6.8
Small equipment (vacuum cleaner, microwave, shavers)	3	1.2
Information Communication Technology ICT (smartphones, laptops, printers)	111	4.4
Total	**250**	**100**

Table 5 shows that the electronic devices and equipment most used by the participants were 44.4% percent of communications equipment, and 29.6% percent of heating and cooling equipment, followed by screens of all kinds with 14.8%. A study conducted in Nigeria agreed with our study that the highest category of electronic equipment used by participants was an information communication technology ICT (Azodo,2017), The results of the Australian survey on the types of devices used differed from what we found (Islam, 2020).



	repair it and reuse it	in the house	sold	it was disposed of
Large electronic devices%	18.8	24.4	24	32.8
small electronic devices%	8.4	74.4	5.6	11.6

Figure 6 Dealing with large and small idle electronic devices

Figure 6 shows what the participants did with the large electronic devices that were no longer used and the results were similar but most got rid of them by 32.8%. In a study in Sudan, the behavior of the participants was found to be consistent with that of our study participants, who were discarded by 53% (Abas, 2018). Who keep her at home and cherish her respectively, and 18.8% repair and reuse %24.4, and 24.0%

Also shows what participants did with small electronic devices that were no longer used, and the majority of participants said they kept them in their homes, 74.4%. The behavior of the participants in the Australian study showed great convergence with our study, where 70% stored their devices for a period of time in their homes, and our storage ratio was 74.4% (Islam, 2020) , Another similar study conducted in Nigeria agreed with the same result (Miner, 2020).

Table 6 The most common types of electronic waste in the city

type	No.	%
Heating and cooling equipment (refrigerators -air conditioners - freezers)	124	49.6
Monitors (TVs, computers, tablets)	17	6.8
Lamps (fluorescent lamps - LED lamps-headlights)	40	16.0
Large equipment (washing machines-electric oven-large printing machines)	21	8.4
Small equipment (vacuum cleaner,microwave, shavers)	19	7.6
Information Communication Technology ICT (smartphones, laptops, printers)	29	11.6
Total	**250**	**100**

Table 6 of the participants' views on what is the most common electrical and electronic waste in the city. Most participants reported that heating and cooling devices are the most common (49.6%), followed by lamps and lights (Widmer,2005). The remaining percentages were comparable. In comparison with a study conducted in Khartoum state, Sudan, the percentages for the electronic waste are found varied(Abbas, 2018).

Table 7 Battery replacement period for participants

Replacement period	No.	%
less than 6 months	19	7.6
from 6 -12	81	32.4
12-and over	150	60.0
Total	**250**	**100**

Table 7 Shows that the majority of participants replace their car and smart devices batterie after 12 months or more from the beginning of their use (60%), and (32.4%) of the participants said that they replace them within (6-12 months) from the beginning of their use.

Table 8 The participants' opinion of the accumulation of electronic waste in the city

Do you think there is an accumulation of electronic waste in the city	No.	%
Yes	119	47.6
no	20	8.0
Sometimes	111	44.4
Total	**250**	**100**

Table 8 Shows that the majority of participants said that there is an accumulation of e-waste in the city, according to their opinion, and the rest said sometimes (47.6%) and (44.4%), respectively.

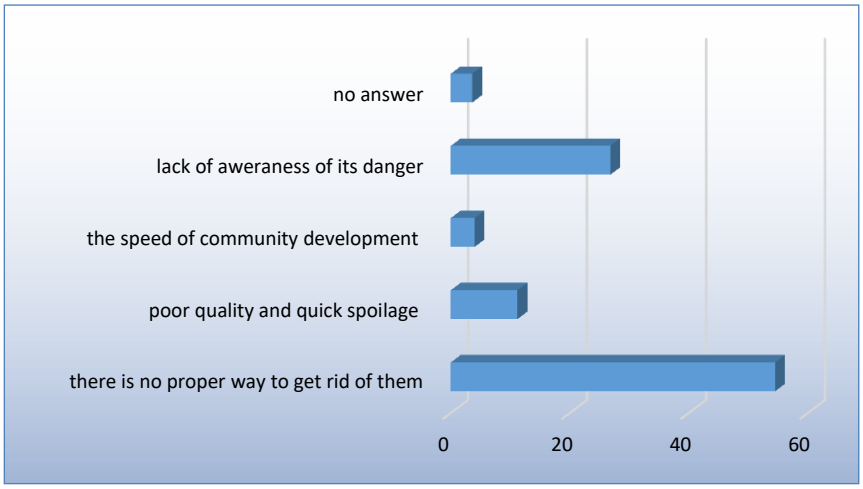


Figure 7 ***The reasons for the accumulation of electronic waste in the city***

Figure 7 shows the opinions of the participants who answered yes or sometimes، in the previous question about the reasons for the accumulation of electronic waste in the city, according to their opinion. The majority said that the lack of proper ways to dispose of it is the main reason, with a percentage of 54.4%, and others said due to a lack of awareness of its danger 26.8%.

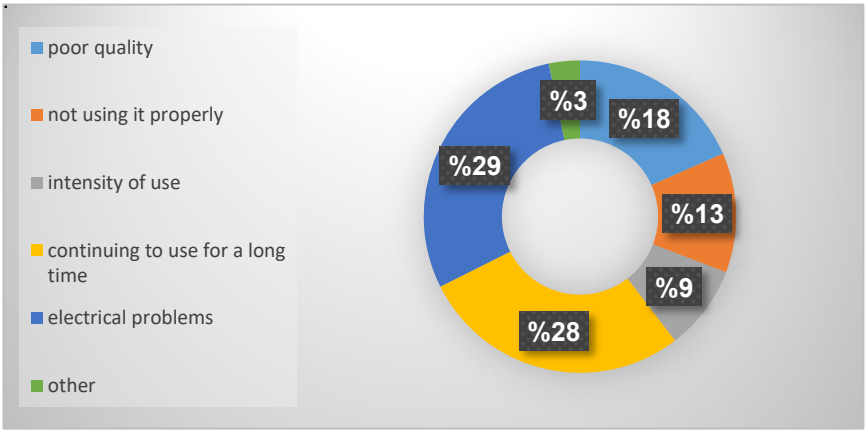


Figure 8 ***causes of damage to electronic devices and equipment***

We note from table NO. (8) The opinions of the participants about the reasons that make electronic waste cause a problem, 49.2% said that it is because of its negative health and environmental impacts, and others attributed the reason to the

difficulty of disposing of it 36.0%.The results of the participants in a study conducted in Sudan showed the convergence of the results with our study, where the highest percentage was from (70-88%) (Abbas, 2018).

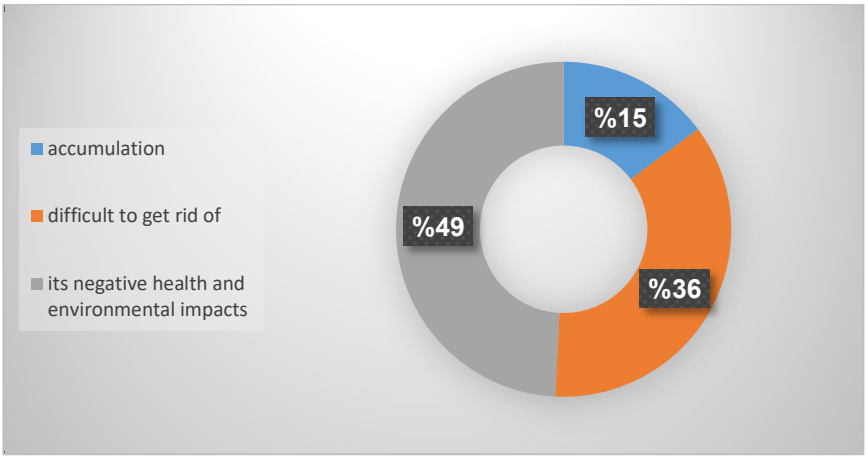


Figure 9 ***Reasons why e-waste is a problem***

A survey conducted in Nigeria showed that the main reason for changing electronic devices and equipment is damage. In our study, we analyzed the main causes of damage and found them as follows; table NO. (16) shows that the responses of the participants about the causes of damage to electronic devices and equipment were somewhat similar, but most of the reasons are due to electrical current problems and the continued use of devices for long periods of time at a rate of (29.2%) and (28.0%), respectively (Miner, 2020).

Table 9 ***Behaviors of participants when buying electronic devices***

Buy new electronic gadgets even if the old ones are still working	**No**	**%**
always	5	2.0
Sometimes	96	38.4
rarely	149	59.6
Total	**250**	**100**

Table No. (9) Shows those participants buy new electronic devices, even if the old ones still rarely work, at a rate of (%59.6) .

Compared to a study conducted in Nigeria، the results of which contradicted our results in terms of the behavior of the participants (Azodo, 2017).

***Table 10* Ideal ways to dispose of electronic waste**

disposal ways of electronic wastes	No.	%
Throw it in the street	18	7.2
Throw it outside of the city	55	22.0
with municipal waste	66	26.4
other	111	44.4
Total	**250**	**100**

Table No (10) for measuring participants' awareness of the appropriate method for the ideal disposal of electronic waste shows that 44.4% were using a different method than the rest of the other non-ideal options.

***Table 11* Participants' e-waste disposal habits**

		yes	NO	Sometimes
Do you put electronic waste with household waste?	NO.	37	151	62
	%	14.8	60.4	24.8

Table 11 shows that the proportion of respondents who did not put e- waste with household waste was 60.4% higher. The mixing of e-waste with household waste is similar. In a study in Nigeria, 25 respondents exhibited in proximity of participants (Azodo, 2017).

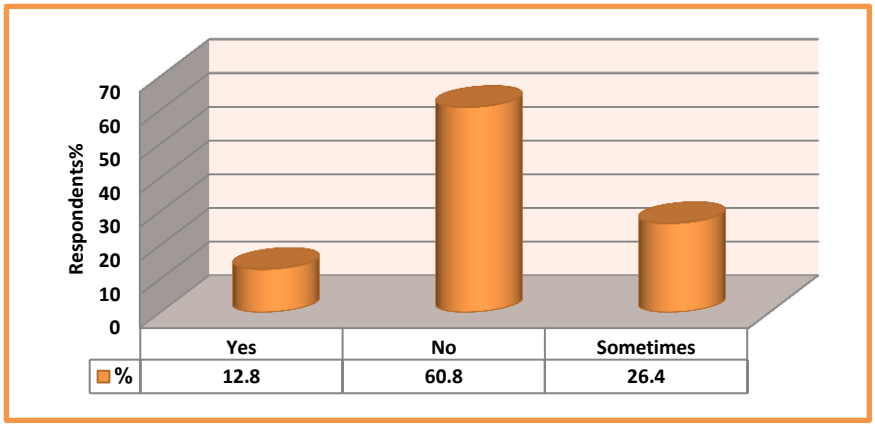


***Figure 10* Knowledge of the participants about the components of electronic device**

Figure 10 shows that the majority of participants were unaware of the internal components of 26.4 per cent of their appliances and 60.8 percent of their home electronics. And some 12.8% of them are knowledgeable and some of them are.

Table 12 The component material of the used electronic equipment

The component material of the e-wastes	No.	%
Lead	67	26.8
cadmium	12	4.8
Mercury	12	4.8
Arsenic	6	2.4
I do not know	153	61.2
total	**250**	**100**

Table (12) Shows that the majority of participants are unaware of the chemicals involved in the installation of equipment and electronic devices that they use, with a percentage of 61.2%.

Another study in India agreed with our results, and their highest percentage, in particular, was 47% (Arya, 2020).

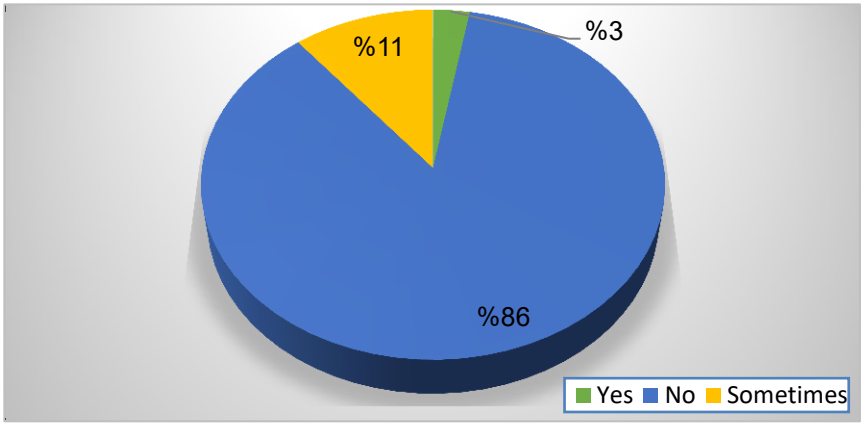


Figure 11 The opinion of the participants regarding media awareness about electronic waste

Figure 11 Shows that most of the participants said that there is no awareness in the various media of the dangers of electronic waste, at a rate of 86.4%. Compared to a similar study in Nigeria, it was agreed with our study that the highest percentage of respondents' opinions were, 32% that there is not enough media awareness (Miner,2020).

Table 13 ***The opinion of participants on the danger of e-waste to health and environment***

Do you think e-waste has health and environmental risks?	No.	%
Yes	202	80.8
sometimes	43	17.2
No	5	2.0
Total	**250**	**100**

Table (13) Shows that most of the participants believe that electronic waste has health and environmental risks with a percentage of (80.8%), and (17.2%) say sometimes. Results in a study conducted in the State of Sudan showed great convergence with the results of our study was (70-88%) (Abbas , 2018).

the results of a similar study conducted in Nigeria in which the majority of participants agreed that electronic waste has risks to health and the environment was 72.5% (Miner, 2020).

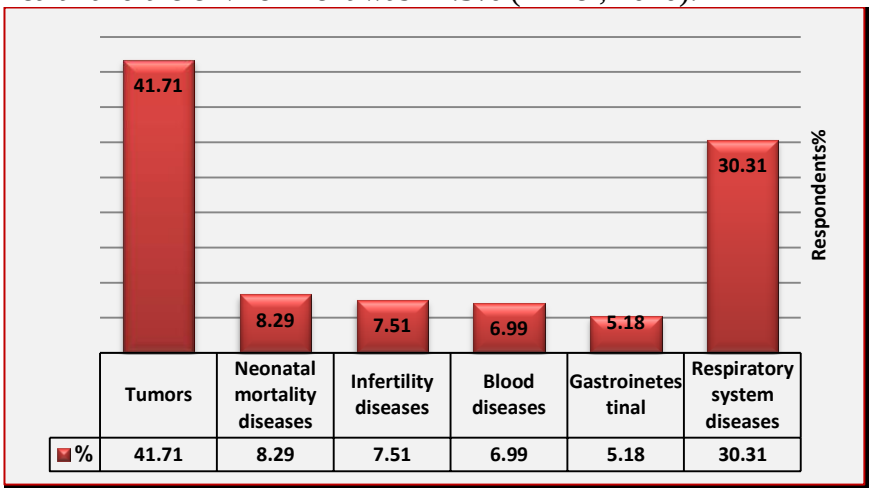


Figure 12 ***Diseases resulting from electronic waste, according to the participants' opinion***

Figure 12 Related to the previous question shows the types of diseases that may affect us because of e-waste, according to the participants' beliefs. The results showed that most of the participants said that they cause tumors, followed by respiratory diseases. In comparison with the results of a similar study conducted in Sudan, it was noted that there is an agreement in the results regarding health risks (Abbas, 2018).

***Table 14* knowledge about any local or international policies or laws for the management of electronic waste**

		yes	No	Sometimes
Did you know that there are any local or international policies or laws for the management of electronic waste		27	120	103
	%	10.8	48.0	41.2

Table 14 Shows that the majority of respondents are not aware of any local or international policy or laws for electronic waste management (48%), and (41.2%) said they are not sure of that. Compared to similar studies in the following countries: India, Sudan and Nigeria, their results are consistent with those of our study, and were, respectively, 90%, (35-71%) and 57.7%, as most participants had insufficient knowledge of local or international laws and policies on e-waste management.

***Table 15* knowledge about any local and community programs or activities for the disposal of electronic waste**

	NO.	yes	NO	Sometimes
Are there any local and community programs or activities for the disposal of electronic waste?		11	134	105
	%	4.4	53.6	42.0

Table 15 Shows that the participants said that there are no local and community programs or activities to dispose of electronic waste with a percentage of (53.6%), and (42%) said that they are not sure of that. In comparison with a similar study conducted in Nigeria, its results showed agreement with our questionnaire (Azodo, 2017).

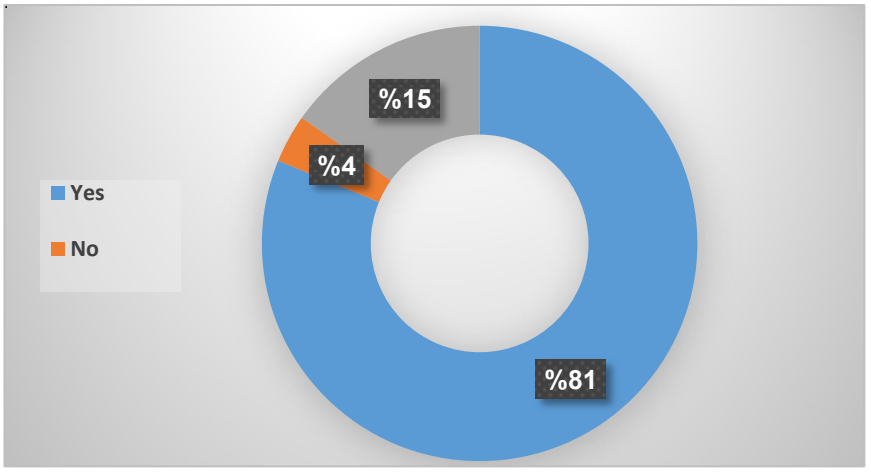


***Figure 13* Participants' opinion on the possibility of recycling electronic waste**

We note from Figure 13 that the majority of participants said that electronic waste can be recycled at a rate of (81.2%). Referring to a similar study conducted in the Kingdom of Jordan, which showed congruence in the results with our questionnaire about the participants' awareness of the possibility of electronic waste recycling, 90% of them said that electronic waste could be recycled (Fraige, 2012); the awareness of the participants in the Sudan study was also high regarding the possibilities of recycling electronic waste (Abbas, 2018).

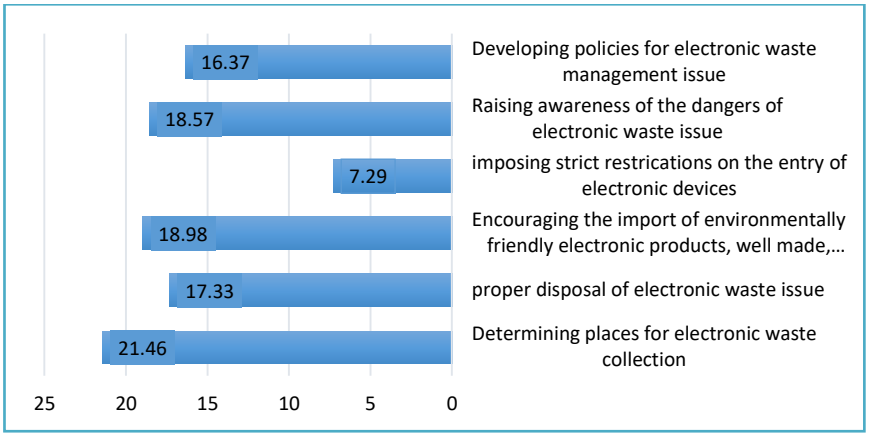


***Figure 14** ways to reduce the risk of e-waste accumulation*

Figure 14 Shows the participants' opinions on how to reduce the risks resulting from the accumulation of electronic waste, and most of the participants agreed that the most important point is to identify places for collecting electronic waste. The behaviors of the participants in a study in Sudan were consistent with the behaviors of the respondents in our study (Abbas, 2018).

***Table 16** Relationship between sample knowledge and awareness of the concept of e-waste and its environmental and health impacts*

e - waste health and environmental risks		Do you know what electrical and electronic waste is?		Total
		Yes	No	
Yes	No.	130	72	202
	%	64.4	35.6	100
No	No.	2	3	5
	%	40.0	60.0	100
Sometimes	No.	18	25	43
	%	41.9	58.1	100
$x^2 = 8.326, d.f = 2 p.value = 0.016$				

Table (16) shows that the majority of respondents with knowledge of health and environmental risks from e-waste were 245 (98%) compared to Do you know what e-waste is? with yes or no levels, where the chi-square test was(X^2 = 8.326) with a degree of freedom (2) and the probability value (0.016) was less than the level of significance (0.05), where the relationship between the two variables was statistically significant.

***Table 17* Relationship between e-waste, environmental and health risks**

e - waste health and environmental risks		e - waste is a problem			Total
		Accumulated.	Hard to get dispose of	Negative health and environmental impacts	
Yes	No.	24	69	109	202
	%	11.9	34.2	54.0	100.0
No	No.	1	2	2	5
	%	20.0	40.0	40.0	100.0
Sometimes	No.	12	19	12	43
	%	27.9	44.2	27.9	100.0
$x^2 = 12.237, d.f = 4 p.value = 0.016$					

The table shows that the majority of respondents with knowledge of health and environmental risks from e-waste (245 or 98%) in the sample, compared to whether you think e-waste is a problem because of the levels (Their accumulation - the difficulty of eliminating them - their negative health and environmental effects) where the test of chi-squared (X^2=12.237) with freedom degree of 4 and the probability value (0.016) was lower than the level of significance (0.05) where the relationship between the two variables was statistically significant.

***Table 18* Relationship between average monthly income and health and environmental risks of e-waste**

Do you think e - waste has health and environmental risks		average monthly income					Total
		Less than 500	From 501-1000	From 1001-1500	From 1501-2000	More than 2001	
Yes	No.	19	85	36	34	28	202
	%	9.4	42.1	17.8	16.8	13.9	100
No	No.	1	3	0	1	0	5
	%	20.0	60.0	.0	20.0	.0	100
Sometimes	No.	11	12	3	6	11	43
	%	25.6	27.9	7.0	14.0	25.6	100
$x^2 = 17.615, d.f = 8 p.value = 0.024$							

The table shows that 98% of respondents with knowledge of health and environmental risks from e-waste were 245, compared to average monthly income levels, (less than 500- from 501-1000 - from 1001-1500 - from 1501- 2000 - more than 2001) where the test of chi-squared (X^2=17.615) with freedom degree of 8 and the probability value (0.024) was less than the level of significance (0.05) where the relationship between the two variables was statistically significant.

6.Conclusion and Recommendation

6.1 Conclusion:

The accelerated production of electronic devices and equipment as a result of global demand and the trend toward globalization and the tendency of most countries to electronic transactions in various fields. All these factors and more contributed to the production of the problem of electronic waste and its increasing accumulation, In turn, we tried to shed light on this problem, and measure the extent of awareness of it and the resulting risks to human health and the environment. Our research was conducted in the State of Libya, specifically in the city of Benghazi, and we targeted the students of the Faculty of Public Health at the University of Benghazi, because they are the closest specialization to community health and because they are specialists in this field. We concluded from the results of the study that there is awareness about the term electronic waste, and it was weak for the target group, specialists in the health, environmental, and community health fields. There is also a severe lack of awareness in the various media of its dangers and how they affect health and the environment, there is weakness in the local and international laws regulating this sector, according to the participants' opinion. The results of the study also showed that most of the participants were ignorant of the internal components of electronic devices, and thus they were ignorant of the risks and damages resulting from them. Most of them follow incorrect behavior by mixing electronic waste with household waste. Most of the participants believe that setting collection and separation points, for waste will reduce the problem, and setting up a complete mechanism from the government to manage and recycle electronic waste in the country will reduce the risks of this problem and put an end to it and its negative effects.

6.2 Recommendation:

1. Increase awareness-raising and education on the risk and harm of e-waste to health and society for the general public and especially for professionals such as students of the College of Public Health.
2. Conduct more extensive and in-depth studies on the negative health and environmental risks and impacts of e-waste.
3. Conduct thorough studies and research on the volume of domestic consumption of electrical and electronic products and the volume of electronic waste generated in relation to the volume of consumption and compare them to international indicators and standards.
4. Establish a comprehensive collection and sorting mechanism for electronic waste, then transport it to a designated collection area.
5. Encouraging recycling in accordance with modern and hygienic regulations of both government and private sectors.
6. Legislation and regulations for the management of e-waste and for the recycling of e-waste.
7. Tightening import policies to require that high-quality or good electronic products be imported.
8. Taxation of non-essential electronic and electrical products or accessories.
9. Fines for dumping electronic and electrical waste on streets or in public squares.
10. Creating awareness by conducting workshops and media awareness about the dangers of e-waste and how to treat it.

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