



SOLAR-POWERED ILLUMINATION IN THE PHILIPPINES

Exploring its acceptability in domestic flame burns prevention

University of Leeds
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Student ID: 200681546

Abstract

Introduction: The Philippines' inability to facilitate electrical access for many of its population has left roughly 800, 000 households reliant on kerosene lamps, the 'toppling' of which is the number one cause of house fires in the world. Solar-powered lamps (SPLs) have been shown to be an effective, renewable alternative to such open-flame devices.

Aim: To highlight both advantages and disadvantages of solar-powered lamps in comparison to their open-flame counterparts and explore their acceptability for domestic burns prevention in the Philippines.

Methods: This study uses a cross-sectional, qualitative design. A total of 12 semi-structured interviews were carried out using a pre-established interview guide. Following transcription, the data was analysed using a framework analysis approach in a bid to reduce uncertainty and enable transparent summarisation and synthesis

Findings: Advantages of SPLs included their ease of use, their economic viability, versatility and better quality of illumination. Disadvantages included its inability to get wet and lack of means to have the device fixed if it was to break. The major health benefit regarded by the participants was that the SPL is safer to use than its open-flame alternatives. Every participant said they prefer the SPL to its open-flame alternatives.

Discussion: SPLs are a simple and effective method for reducing the rate of domestic burn injuries within the Philippines. The extensive benefits of SPLs, such as their cost effectiveness, should be highlighted in campaigns geared towards increasing the usage of SPLs. Barriers to accessibility of SPL purchase and repair should be tackled through subsidiary schemes and market research must be carried out prior to distribution to ensure the most appropriate SPLs are issued within a given region.

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List of Acronyms

LMIC: Low-Middle Income Country

DOH-HEMS: Department of Health – Health Emergency Management Staff

SPL: Solar-powered Lamps

HSSi: Hybrid Social Solutions Inc.

1. Introduction

1.1 Background

Burns are among the most devastating injuries inflicted upon the human form due to their outcomes which carry not only physical impairments, but also a vast emotional and mental toll^[1]. Over 90% of fatal fire-related burns occur within LMIC (low-middle income countries), with almost half arising in the South-East Asian region^[2]. The majority of burns occur in homes^[3-5], a great number of which are flame burns due to various sources of illumination following a lack of access to electricity^[6].

There are roughly 1.5 billion people worldwide who do not have sufficient access to electricity within their homes^[7]. Subsequently, an estimated 500 million households use dangerous fuel-based devices such as kerosene lamps^[6] (Figure.1^[8]), the 'toppling' of which is the world's primary cause of house fires^{[9][10]}.

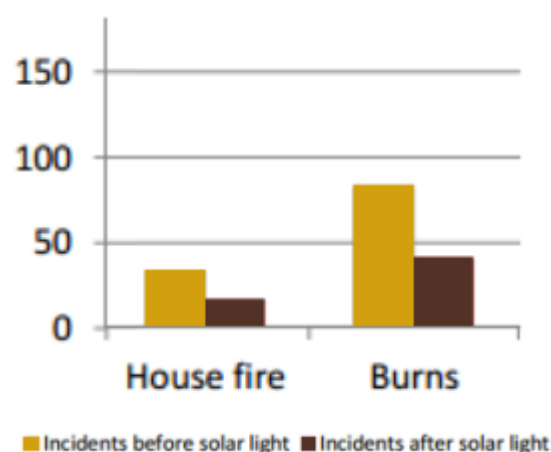


Figure : Example Kerosene Lamp^[8]

1.1.2 Philippines

The Philippines poses a challenge for the electricity market as it boasts over 2,000 inhabited islands, making connection to the electrical grid for those within remote areas, especially the indigenous Aeta residing with the mountains^[11], close to impossible^[10]. This has left the country with almost 3 million households without access to electricity^[11], 800,000 of which rely on kerosene lamps^[9]. The number increases drastically when taking into account intermediate use of either kerosene lamps or candles during regular power shortages. This factor is further perpetuated as the Philippines is the third most disaster prone country in the world, having to face more than a dozen typhoons annually^{[7][9]}.

Fires are the most costly preventable emergency in the Philippines, and illumination would be a key area of focus as studies from the Department of Health – Health Emergency Management Staff (DOH-HEMS) revealed that neglected or unattended open flames were the most common cause of fire-related casualties^[13]. Solar-powered lamps (SPLs) have been the item of choice for many global initiatives that aim to equip households with safe, sustainable energy^[14-17].



Studies have shown SPLs to be an effective choice in reducing incidents of fires and burns (Figure 1^[15]), while also being beneficial in areas of: relieving financial burden, global warming, and extension of work and study habits^[14-17]. There is, however, a gap in qualitative studies exploring the acceptability and modes of adherence to SPL use – information that can be used in future promotion of initiatives – which this study aims to address.

1.2 Aims & Objectives

Aim: To highlight both advantages and disadvantages of solar-powered lamps in comparison to their open-flame counterparts and explore their acceptability for domestic burns prevention in the Philippines.

Objectives:

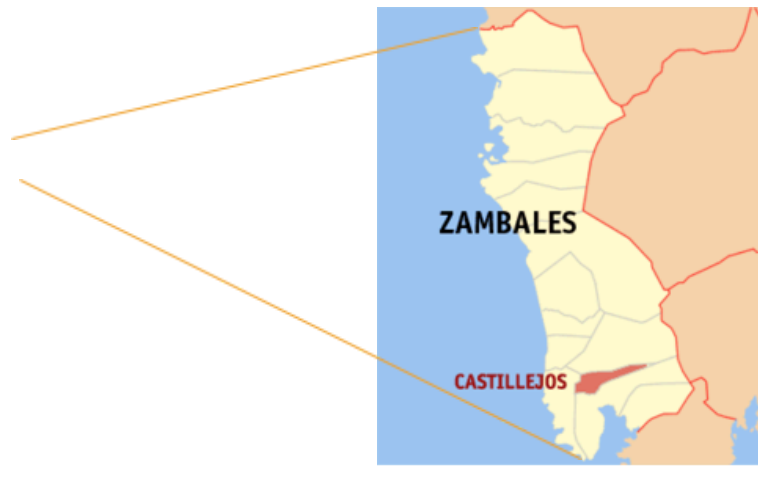
- To investigate the existing attitudes towards flame-based (kerosene, candle and wood) illumination and their alternatives.
- To assess the quality, and practicality of adherence to the use, of solar-powered lamps.
- To examine the suitability of solar-powered lamps as an alternative primary source of illumination in the place of kerosene lamps and candles.

2. Methodology

2.1 Study Location

The Philippines is a country with a 102 million large population, 44.9% of whom live in urban areas while 55.1% reside in rural regions^[18]. The project was carried out at TripleBCare Projects Inc. burns clinic, based in Castillejos, Zambales, on the main Island of Luzon^[19]; an ideal mid-way location between the mountainous Aeta region and the district capitol, Olongapo.





2.2 Study Design

This study investigated the acceptability of SLPs as a kerosene or candle alternative as a primary source of illumination using a cross-sectional, qualitative design. A qualitative approach was taken to enable an in depth understanding to the phenomena of what ownership of a solar lamp will mean for Filipino locals^[21].

Ethical approval was obtained from the University of Leeds before the study was undertaken.

2.3 Sampling and Participation

Within this project, purposive sampling was used to select participants via a gatekeeper – TripleBCare Projects Inc. – who hosted the study. Below is the inclusion and exclusion criteria:

Inclusion Criteria	Exclusion Criteria
Be ≥ 18 years of age	Be <18 years of age
Experience of using kerosene lamp domestically OR Experience of using candles domestically	No experience of kerosene or candle usage domestically
Had owned a solar lamp for ≥ 2 weeks	Had owned a solar lamp < 2 weeks

Table 1: Summary of inclusion vs. exclusion criteria

A total of 12 interviews were conducted, with the aim of achieving a sample size that allowed for saturation with sufficiently in-depth analysis in the limited timescale^[21]. Participants were provided with an information sheet at least one hour before interviews were scheduled to be conducted to

ensure an adequate length of time for deliberation of the individual's involvement in the study. All participants provided both verbal and written consent.

2.2.1 Interview Preliminary Process

Before the research project was conducted, solar lights were given to the participants that were deemed inclusive of the study criteria by TripleBCare Projects Inc. The solar lamps were donated by an Australian company, Flexiway Solar Solutions^[22], and can be viewed below in Figure.4^[23]



Figure 4: Solar lamps distributed to study participants

2.4 Data Collection

Semi-structured interviews were carried out using a pre-established interview guide^[APPENDIX.1], the questions of which were adapted from existing literature^{[24][25]}. Due to the qualitative nature of this study, open-ended questions were used to avoid leading participants^[21]. At times, however, probes were used to expand on given answers. The interview guide was structured into three segments, each addressing a study objective, in chronological order.

Interviews were conducted in a mixture of Tagalog or English, depending on the participant's level of English. A translator was provided by TripleBCare Projects Inc. when necessary. All interviews were audio-recorded, the files of which were coded and immediately stored onto the University of Leeds m-drive to ensure both confidentiality and safety of information storage.

A pilot interview was conducted to evaluate the content, language and format of the interview guide. Notes on participant body language and demeanour, including that of the translator, were made to supplement each interview, endeavouring to attain a comprehensive understanding of the participant's responses^[26].

Interviews were completed over a two-week interval in June 2016.

2.5 Data Analysis

All recordings were transcribed^[APPENDIX.2], additional notes and grammatical signs to portray intonations and tone were added.

Following transcription, the data was analysed using a framework analysis approach in a bid to reduce uncertainty and enable transparent summarisation and synthesis^{[27][28]}. After immersion and familiarisation ensued the formation of A-priori themes based on study objectives and existing literature^{[7-8][13-17]}; data was then revised to obtain inductive emergent themes. Data was then placed into a matrix using a “*cut and paste*” method^[26] and further subdivided into codes (of both an A-priori and emergent nature). Continuous re-validation occurred through iteration, re-evaluation and re-arrangement of codes^[29].

A summary of the data analysis process can be found in Figure.5 below.



Figure : Summary of data analysis process

2.6 Limitations

The main limitations of this study are threefold: translator, sampling, and social desirability bias.

Translator Bias

The use of a translator introduced potential for miscommunications bias as to what was relayed to the lead researcher. Having a translator who also worked at the clinic may have lead participants to answer in ways in which they saw would please the translator. Thorough notes on body language and

intonation were taken, however, in a bid to minimalise such an effect. All efforts were made to reword and re-ask questions to ensure full comprehension was obtained.

Sampling Bias

Purposive sampling may have resulted in selection bias as participants were selected by and identified by a host gatekeeper^[28]. Some participants were selected from the same household and so may have shared similar experiences. Yet, each such a participant belonged to different demographic groups and interviews were conducted on a one-on-one basis to avoid duplicated answers.

Social Desirability Bias

The effect of the social desirability phenomenon must also be taken into account – an influence which occurs when subjects bias their answers in a bid to make them more acceptable to the perceived researcher's desire^[28]. Participants in this study may have been more exposed to this influence due to the interviews being undertaken within the open-plan burns clinic, where they may be apprehensive of staff overhearing.

3. Findings

3.1 Attitudes Towards Current Illumination Choices and Their Alternatives

Current Sources of Illumination:

There was a total of 12 participants, all of whom utilized either kerosene lamps or candles on a regular-to-permanent basis. Most had experience with an alternative light source with the following breakdown:

Light Source	No. Participants
Kerosene	9
Candle	7
Flashlight	3
Oil Lamp	1
Wood	1
Charcoal	1

Table 2: Table summarising light sources used by participants

Incidence Occurrence with Light Sources:

Seven participants had experience of an accident with open-flame sources of domestic illumination; six of these occurred due to kerosene lamps, one due to candle. One participant had a near-fatal incident with a kerosene lamp when she accidentally knocked one from a shelf when reaching for a book; the result of which can be viewed in Figure.6.



Figure 6: Extensive scarring and disfigurement following a kerosene lamp burn¹

The other incidences of burns due to kerosene lamps varied from extensive physical impairment to minor burns. Four of the reported incidences resulted in damaged objects with no casualties. Though no physical harm came from the latter mentioned incidences, those involved experienced future apprehension at the prospect of using kerosene lamps and candles once again:

"...it was God's mercy that it did not explode in my hand. That's a big accident in my life if it did. I did not like kerosene after that." – Interview 6.

¹ Permission has been gained from both the participant and host to use this image within this report

Five participants noted they had not considered any alternatives to open-flame sources of illumination as they simply had no knowledge of such options other than electricity, which was either expensive, or not an option due to the remote nature of their housing.

Preconceived Notion of SPLs:

Only four respondents had previous knowledge of SPLs prior to the study, all of whom responded positively to the notion of owning SPLs. Three participants noted that they thought SPLs to be cheap to maintain, and two mentioned that they deemed them safe devices to use.

Of those aforementioned four respondents, only one had previously owned a solar light device which was a gift given from a relative in America. The others stated that they perceived SPLs to be expensive and so did not look into purchasing them.

3.2 Assessing the Quality and Usage of SPLs

Ease of Use

Ease of use was the second most notified characteristic of the SPLs (preceded by aspect of safety and brightness of illumination) when respondents were questioned on their general impression of the SPL. The action of simply needing to put the device under the sun and then turn on as the most common explanation on probing. This was followed by the ease of peaceful sleep due to lack of worrying about remembering to switch off the device.

Ease of use was particularly significant for certain participants who due to burns incidences, had suffered from unilateral or bilateral arm amputations:

“He the one who put under the sun, and he goes and gets it. Using with the elbow, and carries with prosthetic hands.” – Interview 8.

Re-instilling a small sense of independence for individuals who previously depended on their family members to light candles or formulate kerosene lamps.

The ease of use extended to enabling the children of two participants to use the light source, where they previously were not permitted:

“Easy to lights on. Easy to carry. If the kerosene is spilled, and like that, dangerous. But with solar lamp, my daughter can use it. She use it to find her dress!” – Interview 9.

Quality of Illumination:

All 12 participants stated that they were happy with the amount of light produced by the SPLs. Six participants responded that the light was particularly bright and five said that it mimicked the power of electrical bulbs:

“They feel like they have the electric power because it’s so bright...” – Interview 3

Three participants mentioned the length of time they would use the light for during the night, expressing their pleasure at the longevity with only a few hours of charging in sunlight:

“He says he hang the light and he turns on at 7 o’clock and off at 5am, and it’s still bright.” – Interview 8.

Assessment of Design:

When asked on their opinion of the design of the SPL, all 12 participants responded positively saying that they liked it:

“Yeah, good shape. Even the lights on it’s good because circle of lights and it points out wide because bulbs stick out.” – Interview 4.

“... the one from the back – it looks like a mirror. It’s beautiful.” – Interview 8.

The versatility offered by the size of the product and the option for hanging on ceilings appealed to respondents, seven of whom expressed their fondness for this attribute. Such features lead to participants using the light regularly outside of brownouts, either as nightlights (as mentioned by three respondents) or hand-held devices:

“It’s good, and the size makes it really handy. You can put it in your bag, and even if you go to a picnic you can use that one. You can just put it in the sun and at night if you don’t have a bonfire you can just use the solar lamp. Easy.” – Interview 2.

A summary of the methods in which participants used the SPLs are as follows:

Method	No. Participants
Hanging	8
Carry	6
Place on surfaces	3

Table 3: Summary of methods of SPL usage

Improvements were, however, a suggestion for the replacement of the clips from which the lamps were hung, such as the use of flexible rubber instead of plastic (Interview 12), as three were reported to break.

Further improvements suggested included providing bigger lights (four participants) and the acceptance of solar rechargeable batteries in case the current one breaks (two participants):

“It should be bigger... so that the house has a wide light.” – Interview 1.

Economic Viability for Maintenance:

When asked what their favourite aspect of the SPL was, 1/3 participants mentioned the lack of expenses required to use the device, which went hand-in-hand with its renewability when specifically comparing to candles. This was a particularly significant benefit for those from the poorest, most rural regions:

“No expenses at all! Here in the Philippines, it’s really hard with money, it’s really very very hard for other people to have a money...”. – Interview 6.

It was, however, mentioned by four participants that though free to use, maintenance of the SPL in case the product broke was close to impossible. They affirmed that they either would not know whom to take it to for it to be fixed, or would not be able to afford the costs:

“They have to take it to an electrician and it is too expensive, so wouldn’t be able to.” – Interview 3.

Product Endorsement:

All 12 respondents said that they would recommend the SPL to both friends and family:

“Yes, she says they all wanted that light, because they had no solar light in their place so they wanted that one. They are, everyone there, very eager to have one.” – Interview 7.

On questioning on whether they would consider selling the SPL, all participants refused to do so, specifying that they both needed and used the lamp too often, or that they do not know where they would get a similar device from again:

“The neighbours asked, because they saw that one in their house... and asking her, just sell that one to me, I will buy it 500. She says ‘no way I will sell to you because I need that light.’” – Interview 11.

3.3 Assessing the Suitability of the SPL as Non-open-flame Alternative

Positives of SPL in Comparison to Open-flame Sources

The participants all stated that they found the SPL easy to use as it only required the flick of a switch. This was especially highlighted when compared to kerosene lamps which require the purchase of kerosene and then the construction of the lamp before it can be lit, which can be time consuming. There also appeared to be more of an ease in regards to peace of mind:

“It’s easier because you just charge and hang, and it’s okay. But the candle, if you leave, she’s scared it will fall down and burn.” – Interview 10.

All 12 of the respondents believed SPLs to be cheaper, stating that though the initial cost of the SPL may be high, the long-term cost when compared to buying either kerosene or candles daily swiftly became negligible:

“Kerosene is 80-90 pesos for the litre, then you go out for the gasoline station which is 100 pesos for transport on our place... so you see the difference.” – Interview 6.

The SPL also gives better illumination both in terms of brightness and longevity. Five participants mentioned the SPLs ability to have a wide reach and light up the room it was used in as a whole, which is better than both kerosene and candle which require to be carried to illuminate a given space. All participants said that the SPL lasted for more hours during a night than its open-flame counterparts. This held true particularly during typhoons, where three participants noted the tendency of kerosene lamp or candles’ light to blow out due to the gusts of wind:

“With candle, you want to go over there you have to carry it with you, and sometimes, you’re going to burn. Solar, just get it, hold it, or hang it, and whole room is light.” – Interview 5.

“It’s better to use this one [points to solar lamp], because if there’s a storm, or a wind like this, the light won’t turn off. But with kerosene the light will turn off, and you use a match, and the match will be all gone, sometimes one box in one night!” – Interview 8.

Negatives of SPL in Comparison to Open-flame Sources

There were two main negatives of the SPL design that were highlighted by the participants: the first, the devices inability to withstand rain, and secondly, the lack of affordable services available to fix broken devices:

“He says he really watch that lamp. And waiting to see any rain to run and get it. He says he’s really scared if it breaks.” – Interview 6.

Though one participant did mention that the device did still work even after being exposed to mild rain:

“I think okay, because I had forgotten it outside, but then I wipe it and it still work... It wasn’t long which might be why.” – Interview 6.

Attitudes to Health and SPL Usage

All participants stated that they considered the health outcomes of using SPLs compared to the kerosene lamp or candle they were using previously. They expressed worries which they no longer hold using the SPLs as:

Health Beneficial Factor	No. Participants
Safety from fires	10
No Soot Inhalation	6
No Lung Disease	4
No Gas Inhalation	3
Environmentally Friendly	1

Table 4: A summary of the health benefits of SPL usage compared to open-flame sources

Two participants had already made the switch from kerosene lamps to candles due to the exacerbation of their child’s breathing difficulties:

“Yes, would definitely chose to buy the SP, even if you have to save up. It isn’t just a risk of burns, but also an issue for your lungs.” – Interview 2.

Every participant said that health outcomes would be a determining factor in their choice of illumination; even if the SPL may initially be the more expensive option:

“Yes of course, if I had the money, even 500 pesos” – Interview 9.

When asked if there was anything they would like to add to the experience of SPL usage, five participants expressed wishes for more education on the availability, benefits and usage of SPLs for the wider communities:

“I think in the Philippines, it’s much better to educate some people about it. Especially those in the mountain area, too far place, because our place there is still electricity, maybe 100m from our place there is no more electricity there. They have children... they can get burn. Their protection also.”
– Interview 6.

3.4 Summary of Findings

Use of SPLs

- Advantages:
 - Easier to use
 - Cheaper
 - Versatile
 - Better quality and length of illumination
- Disadvantages:
 - Not waterproof
- Acceptability: all participants said they would purchase the SPL over its open-flame counterparts.
- Accessibility: many do not have the means to fix SPL if it breaks.

Health Beliefs and SPLs

- The major health benefit regarded by the participants was that the SPL is safer to use than its open-flame alternatives.
- All participants stated that health is important enough to be a deciding factor in their choice of illumination.
- Almost half of the participants asked for more education on SPLs and their importance in burns safety within communities.

4. Discussion

This discussion aims to compare and contrast the findings from this study to those in existing literature, and explore in implications of the findings from which four recommendations are made. The recommendations will be specific to stakeholders in the Philippines, namely burns clinics such as TripleBCare and the DOH-HEMS.

4.1 Benefits of SPLs

Safety was the most common benefit of the SPL voiced by the study participants, followed by the quality of illumination and the lack of expenses to use the device. These findings are in line with previous studies in similar resource poor setting of Uganda^[30], Bangladesh^[31] and India^[32]. Similar

responses were found by studies in other regions of the Philippines where 17% of the respondents felt safer at home^{[9][33]}. The priorities of benefits did, however, differ between this study and the findings within this report which highlights the need for understanding what is regarded as important within each community when portraying the benefits of SPLs. It must be noted, however, that this study was carried out in a burns clinic and hence fire risk may have been emphasised due to the setting, though the risk of this was minimized by ensuring participants who had not experienced burns were included.

Existing literatures have unanimously emphasized the economic viability of SPLs to varying degrees dependent on regional costs of kerosene, candles and other illumination alternatives^{[12][14-17][30-35]}. In the Philippines, this can range from a 80% reduction in the money spent on kerosene and candles in electrified houses to a 55% reduction in off-grid houses^[33]. This is a crucial benefit for those in the poorest regions of the Philippines, and so must be greatly emphasised in promotion and marketing of SPLs.

One aspect of the SPL that might be specific to the SPL design used within this study is the versatility of the portable device. Producers and distributors of SPLs may want to keep in mind this design feature when choosing the most appropriate SPL to include within their range and target community.

4.2 Accessibility of SPLs

The major drawback of the SPL highlighted in this study is the inability to deal with any problems that may arise with the device due to either a lack of repairmen services and inaccessibility to such options due to their expenses. This concurs with findings from India where accessibility and availability were highlighted as barriers to wider adoption of the lamps^[32].

The harsh consequences of such difficulties in fixing broken SPLs is portrayed in an anecdotal account by the CEO of Hybrid Social Solutions Inc. (HSSi) – a company that aims to deliver solar technology to off-the-grid communities in the Philippines – where a customer who depended on the SPL for her livelihood was unable to feed her children for three days during the week the product was under maintenance^[12]. Thus, suitable infrastructures that enable local communities to repair damaged SPLs, both in regards to education and materials, are key to executing effective widespread uptake of SPLs on a sustainable, long-term basis. Additionally, measures must be taken by distributors, such as providing devices that are waterproof, to limit the risk of damage and need for repair.

4.3 Acceptability of SPLs in Burns Prevention

Every respondent within this study said they would prefer to purchase a SPL rather than their open-flame alternatives. This preference is in line with those expressed within the findings of other studies within both the Philippines (where 80% of participants up-kept their adherence to SPL use months after the initial distribution)^[33], and other settings such as Bangladesh where 99.34% of participants deemed SPLs acceptable as a kerosene lamp alternative^[32]. The extensive number of global initiatives aiming to supply resource-poor regions with SPLs: from Korpenik in the Philippines, to Lighting Africa, are testament to SPLs acceptability^{[7][9][14][17]}.

Participants of this study highlighted, however, that more is needed to be done to educate local communities of both the existence and use of SPLs. This was reflected in that only one third of participants knew of SPLs prior to the study. Hence, educational awareness campaigns need to be conducted to ensure locals know of the option that is provided for them by the SPL. These programs must be beyond the nature of simply informing those who have purchased SPLs on their usage^[12] and tackle preconceived notions of SPLs, ensuring they are fully informed. This point is reinforced as those who knew of SPLs previously believed them to be expensive to purchase, which is correct, however, they had not been informed of the long-term economic benefits of using renewable energy from a readily available source such as the sun.

4.4 Recommendations

- 1) TripleBCare to develop consensus with other local organisations, such as Kadasig, who distribute SPLs, within the next three months, in order to develop a strategy to raise awareness of the benefits of SPLs within the region of Zambales.
- 2) Local organisations to seek support and engagement from the local government within the next six months to aid with lobbying for the national endorsement of SPLs, while discouraging the use of their open-flame counterparts, by the DOH-HEMS within the next nine months.
- 3) For DOH-HEMS to corroborate with national organisations who look to deliver SPLs to off-the-grid homes, such as HSSi, to formulate a national strategic plan within the next twelve months. There should be an aim to provide subsidisation of SPL cost of purchase and/or repair, either through funding (e.g. World Bank) or the formation of micro-finance institutes.
- 4) Reviews of each process must be carried out within three months of implementation to ensure quality control, transparency, and effectiveness of strategies at each stage, the findings of which will re-inforce the currently available data within local contexts.

4.5 Conclusion

SPLs are a simple and effective method for reducing the rate of domestic burn injuries within the Philippines. The extensive benefits of SPLs, such as their cost effectiveness, should be highlighted in campaigns geared towards increasing the usage of SPLs. Barriers to accessibility of SPL purchase and repair should be tackled through subsidiary schemes and market research must be carried out prior to distribution to ensure the most appropriate SPLs are issued within a given region.

5. Reflective Conclusion

Working with the host

Working with a host proved incredibly beneficial on arrival to the Philippines, especially as I had never visited South-East Asia before. I was provided with a thorough introduction of the area and of the culture and customs from both foreign and local sources as the staff were both of Australian and Filipino origin.

Having the ability to observe daily burns treatment both in the clinic and during outreach mission gave me a wholly holistic approach to the experience and my research topic – not to mention a wealth of knowledge in both burns care but also healthcare in a rural setting; putting what we learnt during lectures into real life anecdotal contexts.

Living within the complex of the clinic did, however, prove intense at times. It became hard to escape the harsh realities of work in a resource-poor setting, most significantly when I witnessed my first paediatric mortality. Though difficult, this enabled me to build on techniques to deal with highly emotional situations; having fellow medical students whom I could travel with on weekends helped immensely.

Conducting the Research

This was the first instance where I collected research data of a qualitative nature and so a lot was learned through trial and error! Though the pilot enabled me to review my question guide, my ability to probe and secondary questions which arose from previous participants' answers greatly improved over time, which is reflected in the consecutive increase in length of interviews.

I also hit a snag on arrival as it turned out that my host could not contact half of the participants they had in mind. The main form of initial contact would be by mobile phone, and given that most kerosene users are from the poorest socioeconomic backgrounds, many may not have money to load their phones to respond, some did not own phones and so relied on their local pastor to pass on the information.

This meant that I had to use lateral thinking in order to recruit participants, which included interviewing not only those with burns who had been given SPLs but also their family members or friends. In the end, this worked out to the project's benefit as I was given a more balanced view point of SPLs from a mixed demographic.

Writing the Report

I held mixed feelings at the notion of analyzing my data: I was enthused at the idea of truly understanding and evaluating my data, but worried I may carry out the coding incorrectly. After further research on qualitative analysis and actually attempting the work, however, I quickly got to grips with the technique and was immersed in the work before I knew it!

This project not only helped me develop in my academic writing, quantitative methodology, timekeeping and ability to adapt to new settings, but also proved a valuable experience in personal development which I thoroughly enjoyed.

WORD COUNT: 4999

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7. Appendix 1

Investigating the acceptability of solar-powered alternatives for domestic burns prevention in the Philippines

Interview Documentation Sheet

Interview Number:

Participant's Code:

Interview Date:

Location of Interview:

Duration of Interview:

All Persons Present at Interview:

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Age:

Duration of Lamp Ownership:

Exposure to Burns (Y/N):

Type of Burn:

Cause of Burn:

Any notable occurrences during interview:

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Interview Documentation Sheet

Introduction

Researcher gives their name and confirms the participant's name; reminds the participant that this will be anonymised.

Researcher reminds the participant of the aim of the study: "Investigating the acceptability of solar-powered alternatives for domestic burns prevention in the Philippines".

The information sheet and consent form are reviewed by the researcher and participant to ensure fully informed consent.

Opportunity answer any pending questions.

The participant is reassured that they can stop at any time or refuse to answer any questions without consequences - specifying that there is no need to give a reason for doing so and that there will be no implications.

Before beginning questioning, obtain any missing demographics and basic information referring to the interview documentation sheet.

Inform the participant of the availability of a lamp to aid descriptive explanations.

Part 1: Investigating attitudes towards current illumination alternatives

- Have you ever considered/thought about regularly using alternative forms of illumination than that of kerosene lamps/candles?

- Do you use any other light sources? Eg. flashlights?
 - If so, why and when?
- Did you have any opinions on solar-powered lamps (SPL) before you hand one?
 - If yes, what was the source of this perception?

Part 2: Assessing the quality and usage of SPLs

- How did you feel about the SPL?
 - Why?
- Is it easy/convenient to use?
 - If so, in what ways?
- Were you happy with the quality of illumination provided by the SPL?
- Did you like the design of the SPL?
- What did you like most about the SPL?
- How could the SPL be improved?
- Would you recommend its use to family/friends?
- Did you ever consider selling off the lamp?
 - If so, when/why?
- Is there anything else you would like to tell me/think I should know about the lamp?

Part 3: Assessing the suitability of SPLs as a kerosene lamp/candle alternative

- How does the SPL compare to kerosene lamps/candle? Probe: in terms of -
 - a) Efficiency: ease/longevity/illumination power during use
 - b) Affordability: purchase and maintenance
- Did you ever consider the health consequences of either device?
 - Would it be a determining factor in your choice of appliance?
- Do you have any other experiences or thoughts about the SPLs or kerosene lamps you would like to share?

8. Appendix 2

Interview – 6

Key: Interviewer/Translator/Interviewee

I: So what did you use, before you were given a solar lamp, when there was a brown out?

I: A kerosene lamp, for 50 years.

I: Wow, for 50 years.

I: Because now there is electricity in our place.

I: Ahh, but when there is a brown out you still use a kerosene lamp?

I: Yeah.

I: Did you ever have any accidents with the kerosene lamp?

I: None at all.

I: None, at all, hat's good to hear. Did you ever think about using anything else, apart from a kerosene lamp?

I: Oil lamp.

I: Oil lamp?

I: Yeah, and sometimes wood. Bonfire?

I: Oh really, did you ever use candles?

I: Also!

I: Also, candles. Which one did you prefer? The kerosene lamp or the candle or the wood or?

I: All of those three would do. Because you need it.

I: And when would you use the wood instead of kerosene?

I: When there is no kerosene at all, and it's hard to go to this place, the market outside. The kerosene station. It's hard because little transport, that time no transportation at all, because we didn't have any car about or horse and it's too far from our place.

I: Ahh. And did you know about solar lamps before? Did you hear about them?

I: Yeah, yeah.

I: What did you hear about them?

I: My brother in law go to Europe, and he gave us one piece of solar lamp and we use it at the garden. One piece only, and he told us it's solar. We don't know, had no idea about it, but then he gave that solar lamp to us and we are so happy because it no danger at all. Because when we put it in the middle of the farm, at night it's already have a light, and we are so excited about it. No expenses at all. But then somebody took it.

I: Oh no.

I: Yeah, I don't know who, but he took it from us.

T: From the farm?

I: Yeah, somebody took it from the place that we put it and no more.