

Panasonic

**Cambodia Solar Lantern
Distribution Report - June 2023**



2023

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Cambodia Solar Lantern 2023 Report Summary

- The Solar Lantern Project, supported by The Japan Evangelical Lutheran Association (JELA) Foundation and the Panasonic Corporation, aims to provide solar lighting to poverty-stricken households in rural areas of Cambodia. In June 2022, over one thousand solar lanterns were distributed to households in the western provinces of Pursat and Battambang. These distribution areas were identified as extremely poor with limited access to the national electric grid.
- From the end of February through May 2023, approximately one year after the solar lanterns were distributed, a study was conducted, alongside Life with Dignity (LWD), a grassroots partner operating in Cambodia. The purpose of this post-implementation review was to measure the solar lantern's impact across a wide range of socioeconomic determinants including 1) changes related to child study hours; 2) school performance; 3) family socialization; 4) income generation; 5) financial savings; and 6) access to healthcare. The impact study methodology included a household survey, focus group discussions, and key informant interviews.
- Panasonic solar lanterns were used for three main purposes: child study, safety at night, and other family household activities such as cooking. A lesser percentage of lantern recipients identified income generation, fieldwork, and emergency use as the main uses.
- Key benefits cited by the households include an increase in the duration of child study hours, a reduction of total energy expenditure, an improvement in child and family health, enhanced safety at night and improved family socialization.
- More than 95% of the distributed solar lights are still operational today. Lights that are used exclusively indoors - at a lower brightness setting - appeared to have a longer duration of use, when compared to solar lights used outdoors.
- Obstacles for companies entering the solar light market in Cambodia include the lack of a well-developed repair infrastructure, limited microfinance/lending opportunities, and competing companies that offer cheap, but poorer quality lights.
- Prospects for future market growth remain positive. Most importantly, Panasonic has favorable brand recognition for producing high-quality products. In addition, households are gradually becoming aware of solar light benefits, especially in terms of finances, improved health, child education, and care for the environment. Looking ahead, solar lighting will continue to play a significant role in Cambodia's household "energy mix."



Criteria to Determine Recipients

During the period of April - June 2022, the JELA Foundation contracted with Panasonic Corporation to distribute 1,050 solar lanterns throughout the states of Pursat and Battambang. Prior to solar light distributions, the JELA Foundation facilitated an "evaluation of need" which was based on key socioeconomic characteristics including low-income households who do not have steady employment, families with school-aged children, households with individuals who are disabled, households with women as head, and non-electrified households that use kerosene and batteries for lighting. In addition to a detailed poverty assessment as defined by the Cambodian Government, the LWD distribution team used the following point system to determine which households had the greatest need:

Categories	Criteria	Scores	Tick
ENERGY COST¹	Most vulnerable HHs who are non-electrified households that use kerosene and batteries for lighting	5	<input type="checkbox"/>
POVERTY LEVEL	- Households identified as ID poor 1 & 2 - Low-income households who do not have steady employment	5	<input type="checkbox"/>
INCOME GENERATION:	HHs who are doing small business at night (i.e. grocery shops, making cakes etc.), animal raising at early morning & dawn and preparing food for working outsiders.	4	<input type="checkbox"/>
SOCIAL DISCRIMINATION	HHs/ family member(s) who are disabled; Households with women as head and no father present, person with HIV/AIDS and the poor elderly	5	<input type="checkbox"/>
CHILD EDUCATION	- Teachers who light it for doing lesson plans, dormitory OR - Families with at least 02 school-aged children	5	<input type="checkbox"/>
CHILD HEALTH	Mother who just delivery baby and or/and HHs whose children had currently had chronic disease	5	<input type="checkbox"/>
COMMUNITY SUPPORT:	Community leaders, VDMG, CCDM, CBOs (AC, SBG, and PG) and religious identities (churches,) who arrange sessions focused on the needs of communities i.e. village meetings, recording AC loan....	3	<input type="checkbox"/>
HEALTH CARE ACCESS:	VHSG, health center staff and healthcare workers who use solar lights to meet patients during the evening hours.	3	<input type="checkbox"/>
FAMILY SOCIALIZATION:	HHs including close friends who usually engage in additional social activities, including household chores, and having dinners.	2	<input type="checkbox"/>
Total Scores:		37 points	



Distribution and Site Visits

DISTRIBUTION SITE	Pursat	Battambang	TOTAL
DISTRIBUTION DATE	April - June 2022	April - June 2022	
DISTRIBUTION TOTAL	488	500	988
HOUSEHOLD SURVEY	76	117	193
FOCUS GROUP DISCUSSIONS	4	8	12
KEY INFORMANT INTERVIEWS	5	9	14
POST REVIEW DATE	27-28 Feb	1-8 March	
DATA COLLECTORS	5	5	



Pre-implementation Analysis

M A Y - J U N E 2 0 2 2

Baseline Data on:
**Household Energy Use
and
Household Finances**

Household Energy Use (1)

In cooperation with JELA's local partner, Life with Dignity, a survey was carried out to determine energy use baseline data. A total of 193 households participated in the baseline survey using the Kobo Toolbox Application designed by an evaluation specialist. The data were exported to Microsoft Excel for further processing and checked for accuracy, analysis, and reporting.

Our study showed that 66% of the residents relied on battery-powered lamps, as compared to 54% of the households that used flashlights. A smaller percentage of households relied on candles (11%) and kerosene lamps (8%). Approximately 12% of respondents had already started using solar lights prior to the Panasonic distribution.

Description	# of Respondents	Percent
Pursat		
Battery-powered lamp	46	21.60
Kerosene lamp	6	2.82
Candles	4	1.88
Flashlight	21	9.86
Solar	25	11.74
Battambang		
Battery-powered lamp	94	44.13
Kerosene lamp	11	5.16
Candles	20	9.39
Flashlight	94	44.13
Solar	1	0.47
Total (PUR+BTB)		
Battery-powered lamp	140	65.73
Kerosene lamp	17	7.98
Candles	24	11.27
Flashlight	115	53.99
Solar	26	12.21

Prior to the distribution of solar lanterns for the purposes of this project, there was a high level of dissatisfaction with the current energy sources available. An overwhelming 86% of the participants in our study were dissatisfied with the quality of current lighting that was being used.

Description	# of Respondents	Percent
Pursat		
Satisfied	4	1.88
Not satisfied	79	37.03
Battambang		
Satisfied	26	12.21
Not satisfied	104	48.83
Total (PUR+BTB)		
Satisfied	30	14.08
Not satisfied	183	85.92

Household Energy Use (2)

Approximately 70% of households require a minimum of three or more hours of lighting each evening to carry out basic household tasks such as cooking, child care, and field work.

Description	# of Respondent	Percent
Pursat		
1 hour	3	1.41
2 hours	14	6.57
3 hours	34	15.96
4 hours	18	8.45
More than 4 hours	14	6.57
Battambang		
1 hour	25	11.74
2 hours	23	10.80
3 hours	38	17.84
4 hours	24	11.27
More than 4 hours	20	9.39
Total (PUR+BTB)		
1 hour	28	13.15
2 hours	37	17.37
3 hours	72	33.80
4 hours	42	19.72
More than 4 hours	34	15.96

The five most significant problems with current lighting included poor light quality, high cost, electric blackout/outage, risk of fire, and health or respiratory problems.

Description	# of Respondents	Percent
Pursat		
Poor light quality	67	31.46
High cost	29	13.62
Electric blackout/outage	42	19.72
Risk of fire	18	8.45
Respiratory and health concerns	1	0.47
Bad smell/fumes	6	2.82
Battambang		
Poor light quality	100	46.96
High cost	51	23.94
Electric blackout/outage	28	13.15
Risk of fire	26	12.21
Respiratory and health concerns	39	18.31
Bad smell/fumes	24	11.27
Total (PUR+BTB)		
Poor light quality	167	78.40
High cost	80	37.56
Electric blackout/outage	70	32.86
Risk of fire	44	20.66
Respiratory and health concerns	40	18.78
Bad smell/fumes	30	14.08

Household Energy Use (3)

While electricity is now available in many villages, poorer households in rural areas cannot afford electricity at the current rates. During our review, individuals confirmed that the cost of electricity and other types of energy have risen at a faster pace than their income. In response, families continue to seek cheaper energy alternatives, including kerosene, batteries, and wood fuel.



Household Finances (1)

Solar light recipient families reported a wide range of problems facing their community. Their biggest problems included poor household lighting (93%), inadequate food (66%), lack of clean drinking water (57%), insufficient employment opportunities (42%), and poor access to good healthcare facilities (33%). Follow-up on-site interviews confirmed these concerns. During our focus-group discussions, residents commented that unemployment was a serious problem that resulted in a lack of money available to purchase food and clean water, further exacerbating existing disparities in health.

Description	# of Respondents	Percent
Pursat		
Lighting	78	36.62
Food	57	26.76
Clean water	42	19.72
Employment	30	14.08
Healthcare	34	15.96
Education	10	4.69
Battambang		
Lighting	121	56.81
Food	84	39.44
Clean water	79	37.09
Employment	59	27.70
Healthcare	37	17.37
Education	21	9.86
Debt	2	0.94
Road	9	4.22
Total (PUR+BTB)		
Lighting	199	93.43
Food	141	66.20
Clean water	121	56.81
Employment	89	41.78
Healthcare	71	33.33
Education	31	14.55
Debt	2	0.94
Road	9	4.22



Household Finances (2)

Regarding food expenditures, more than 55% of the families spend more than 40% of the family budget on food, which is indicative of the level of poverty in the area. With such a high level of income spent on food, these households have little discretionary income to spend on other life necessities, such as lighting, healthcare, and education.

Description	# of Respondents	Percent
Pursat		
10%	14	6.57
20%	18	8.45
30%	10	4.69
40%	20	9.39
More than 40%	21	9.86
Battambang		
10%	4	1.88
20%	3	1.41
30%	9	4.23
40%	17	7.98
More than 40%	97	45.54
Total (PUR+BTB)		
10%	18	8.45
20%	21	9.86
30%	19	8.92
40%	37	17.37
More than 40%	118	55.4

Still, another 82% of homes said they are not satisfied with accessibility to clean drinking water. Follow-up group discussions confirmed that families regularly experience water-borne diseases, with symptoms such as diarrhea, nausea, and fever.

Description	# of Respondent	Percent
Pursat		
Satisfied	15	7.04
Not satisfied	68	31.92
Battambang		
Satisfied	23	10.80
Not satisfied	107	46.95
Total (PUR+BTB)		
Satisfied	38	17.84
Not satisfied	175	82.16

Post-implementation Analysis



A P R I L - J U N E 2 0 2 3

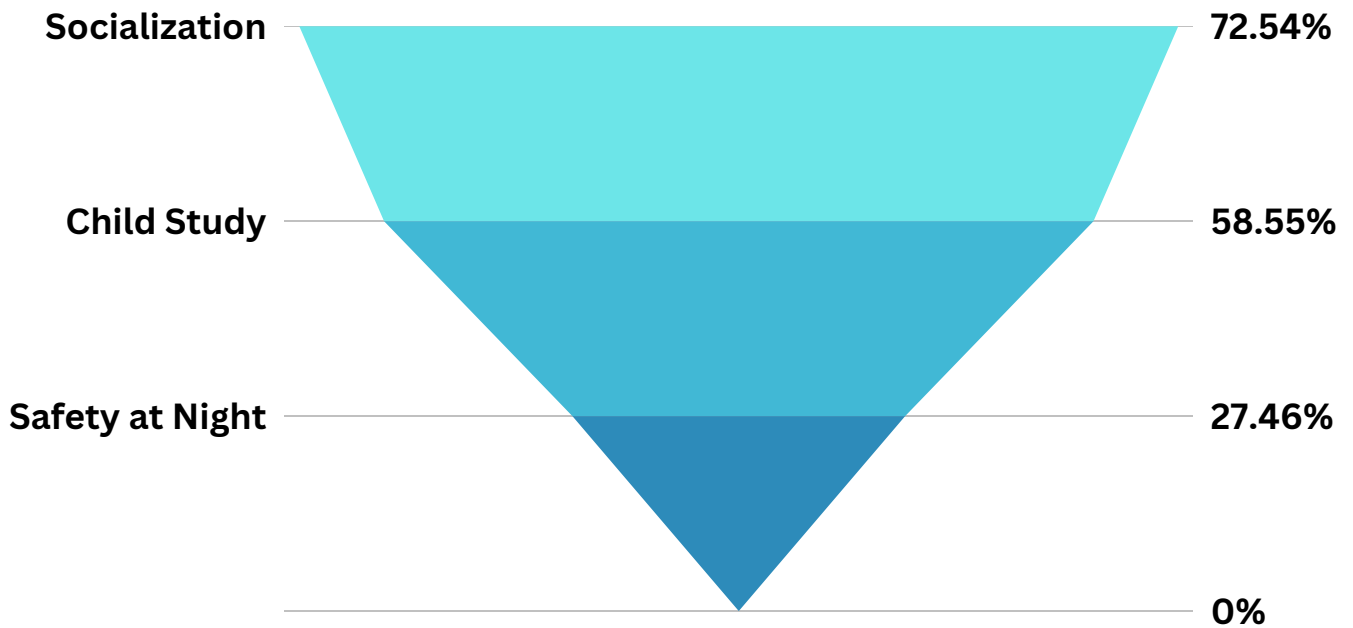
Data Collection on:

**Solar Lantern Uses
Duration of Use
Solar Lantern Benefits**



Identification of 3 Main Uses

Our survey data confirmed that households used solar lanterns for three significant purposes, namely, family socialization, child education, and safety at night. Our follow-up site interviews further confirmed, however, that lanterns were also used to support a growing number of home microfinance businesses at night.



Duration of Use

The sampled respondents reported that the average duration of solar lighting used in the evening was more than four hours for 70% of the households, followed by four hours for 12%, three hours for 8%, two hours for 6%, and one hour for 3% of recipients, respectively. On average, solar lighting was used for four hours each evening compared to the baseline energy use of three hours prior to solar lighting. On-site interviews indicated that solar lighting supported a variety of activities, including cooking, child study, eating and family socialization, walking outside at night, and micro-business activities.

Table 6: Duration of solar light energy use during the evening hours

Description	BTB	PUR	Total
30 minutes	0.52%	0.00%	0.52%
1 hour	1.04%	1.55%	2.59%
2 hours	0.52%	5.70%	6.22%
3 hours	1.04%	7.25%	8.29%
4 hours	10.36%	1.55%	11.92%
More than 4 hours	47.15%	23.32%	70.47%



Child Education

Approximately 59% of the households reported that education was one of the main uses of solar lighting. Moreover, 62% of survey respondents highlighted that child study hours increased significantly with solar light use. On average, child study hours increased one to two hours each evening, with 44% citing a one-hour increase compared to a two-hour increase for 17% of the households.

Description	BTB	PUR	Total
No increase	1.55%	0.00%	1.55%
1 hour	37.31%	6.22%	43.53%
2 hours	6.74%	10.36%	17.10%
3 hours	0.00%	1.04%	1.04%
More than 4 hours	0.52%	0.00%	0.52%
No child in class	14.51%	21.76%	36.27%

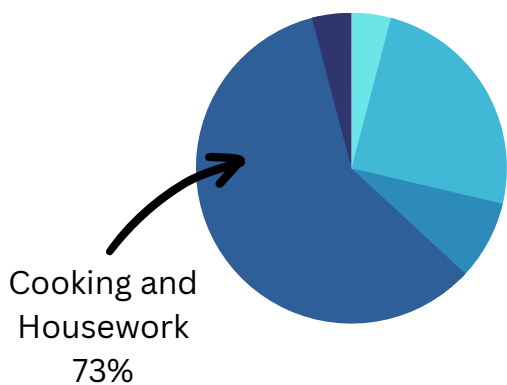
Our on-site interviews confirmed earlier survey data which showed that 30% of children had improved school performance. Parents reported that longer study hours at night - as a result of solar use - translated to better grades and improved school attendance. Teachers informed us that increased study at home directly correlated with the student's confidence in the classroom. Moreover, school absenteeism had improved, which was the direct result of fewer respiratory illnesses caused by kerosene and wood burning.



Safety at Night

A second major benefit was safety at night. Over 27% of the households said that lighting for safety was a main use. In addition to feelings of increased safety, solar lights also protected residents from wild animals and snakes prevalent in rural areas.

Household Activities



According to the survey results, 73% of the recipients indicated that one of the main uses of solar was for household use. More specifically, the majority of recipients utilized solar lighting for cooking, eating, family gatherings, going to the bathroom, and home micro-business activities. In addition, solar lighting was used to support other household tasks taking anywhere from 30 minutes to 4 hours during the evening hours. On average, solar lighting allowed for an increase of an additional hour to carry out household tasks.

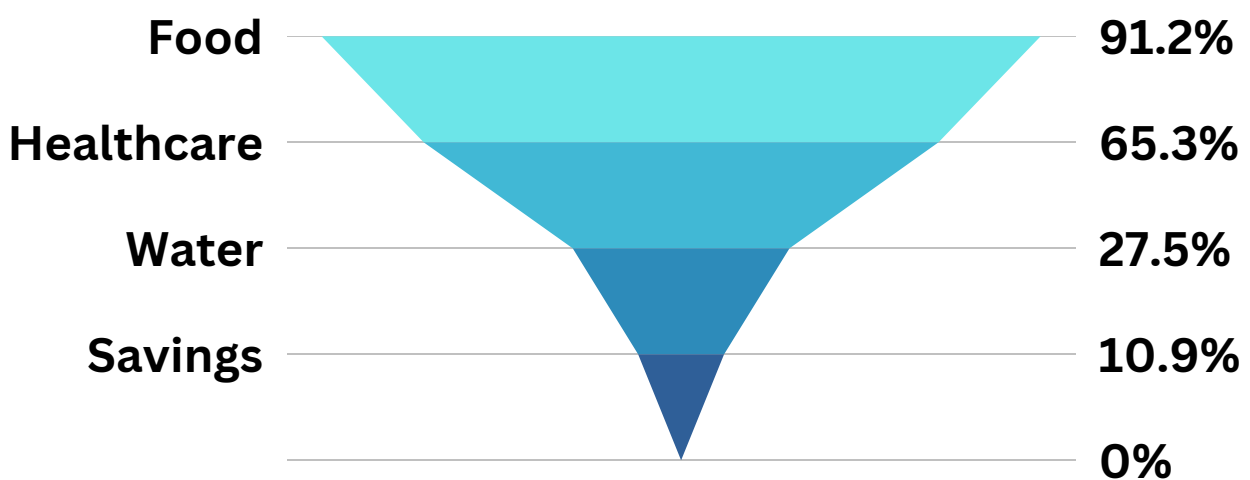
A subgroup of women reported that the solar lanterns permitted them to sell goods at their home-based micro-financed shops during the early evening hours. We had the opportunity to see this work first-hand during our site visits.



Financial Mobility (1)

According to the baseline survey which was carried out prior to distribution, each household spent an average of 5 USD (20,000 KHR) per month on energy. However, the findings examined over a 12-month period beginning with the solar distribution in June 2022, show that, on average, a household saved approximately 26 USD (10,4000 KHR). Theoretically speaking, this level of savings over a three-year period would allow for the purchase of a new solar light which is estimated to cost approximately \$75 USD.

One of the primary benefits of solar light distribution is energy savings. As such, solar light recipients report that they can reduce expenses for energy sources, such as kerosene and wood fuel, and after that have funds available for the purchase of other household necessities. The findings reveal that respondents reallocated energy expenses to cover the purchase of food, healthcare, and water. As shown below, 91% of the respondents reported purchasing more food, 65% allocated more resources for healthcare, 28% bought more water, and 11% reported an increased level of savings.

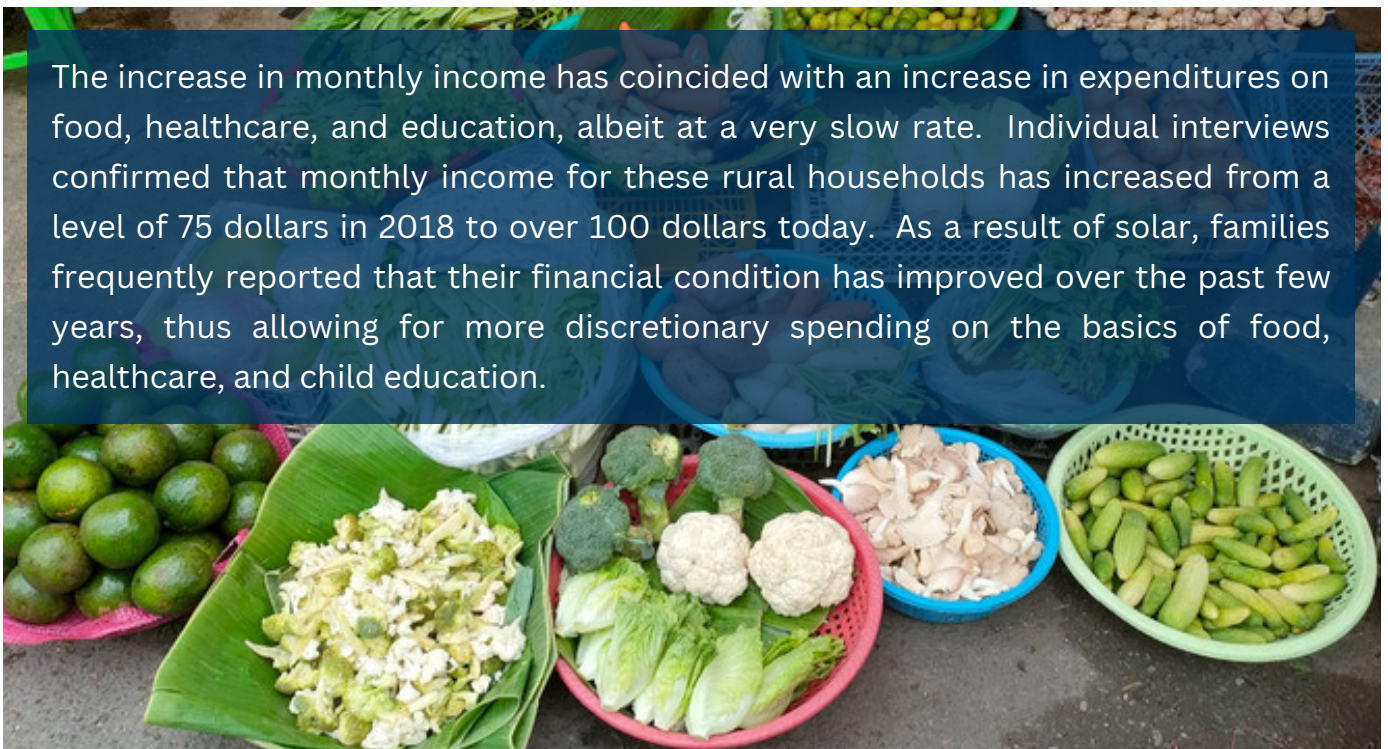


Financial Mobility (2)

Our post-implementation visits confirmed a positive, upward trend in financial security among households during the past five years. Residents commented that the use of Panasonic solar lights enhanced this improvement in family finances. More and more residents are purchasing electronics (i.e., televisions and radios), and cellular phone use has now increased to a level exceeding 90%, regardless of the rural location. It was also evident that the quality of homes greatly improved, with current homeowners now using more stones, bricks, and cement.



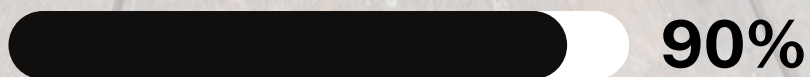
The increase in monthly income has coincided with an increase in expenditures on food, healthcare, and education, albeit at a very slow rate. Individual interviews confirmed that monthly income for these rural households has increased from a level of 75 dollars in 2018 to over 100 dollars today. As a result of solar, families frequently reported that their financial condition has improved over the past few years, thus allowing for more discretionary spending on the basics of food, healthcare, and child education.



Healthcare

Households included in our evaluation showed that 19% of the families, particularly those with children enrolled in school, experienced serious respiratory illnesses prior to the use of solar. Children commonly experienced sore eyes, headaches, and respiratory diseases due to pollutants caused by wood fuel and kerosene. However, the number of families reporting health problems after the use of solar decreased considerably to 3-4%, representing an 80% reduction.

The focus group discussions were consistent with the survey findings. A majority of households reported that they no longer had any health problems since the use of solar lighting. Clearly, there was a significant reduction in the number of sore eyes or headaches that were previously caused by traditional lighting sources.



90% of households reported that solar lighting was either useful or very useful for their family.

Family Socialization



Almost all households reported that another major benefit of solar lighting was that of improved family socialization or communication. Heads of households explained that families were now able to spend more time together in the evenings with less exposure to hazardous fumes from kerosene lamps. A few people even noted that the use of solar lights enabled more time to socialize with neighbors and friends during the evening hours.

Information Access

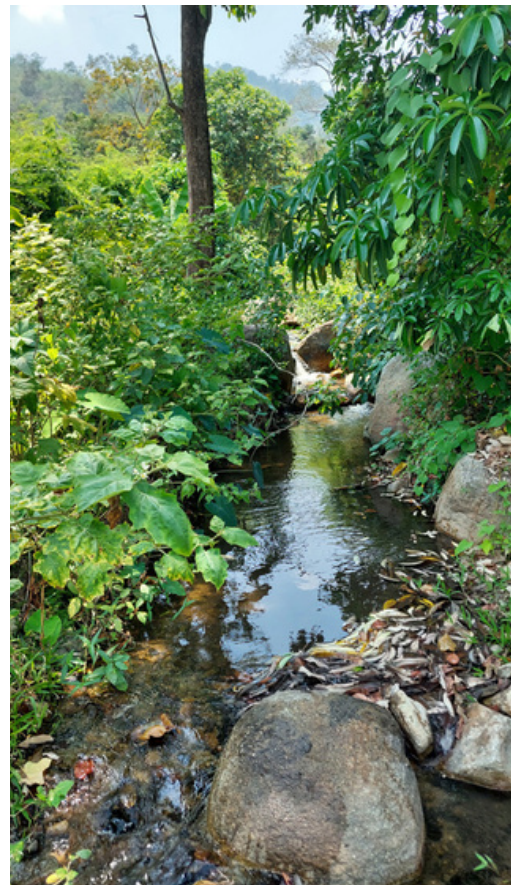


A final significant benefit that came out of our discussions was improved information access. The Panasonic solar lanterns had the added benefit of charging cellular phones at night which, in turn, allowed people to use their phones to access more news and information through the internet. Due to the fact that more than 90% of rural residents in Cambodia now own a cellular phone, this charging function will undoubtedly become increasingly important in the future.



Solar Lantern Benefits Cleaner Environment

Although not a major part of our discussions, another stated benefit related to the use of solar includes a greater awareness of the interrelationship between clean energy use and environmental stewardship. Residents expressed that kerosene and wood burning had negative effects on global warming in addition to individual health. This new awareness about environmental care represents a shift in identified benefits from the individual person to the wider global community in which we live.



Future Directions

Study long-term sustainability of solar light use: The study was not conclusive about long-term sustainability, particularly since households are only expected to use their solar light until the end of product life, typically between three to five years. It was unclear at the time of this review whether households were committed to long-term solar use. Interview sessions confirmed that individuals were not sure if there would be a proper repair infrastructure in place. Also, people voiced concerns that there are many high-cost, but poor-quality solar lights that are now being sold throughout rural Cambodia. As a result, people are very cautious about investing in non-Panasonic products that have a comparatively poor reputation. Solar light recipients said that this issue of long-term sustainability should be carefully studied by all pertinent stakeholders.

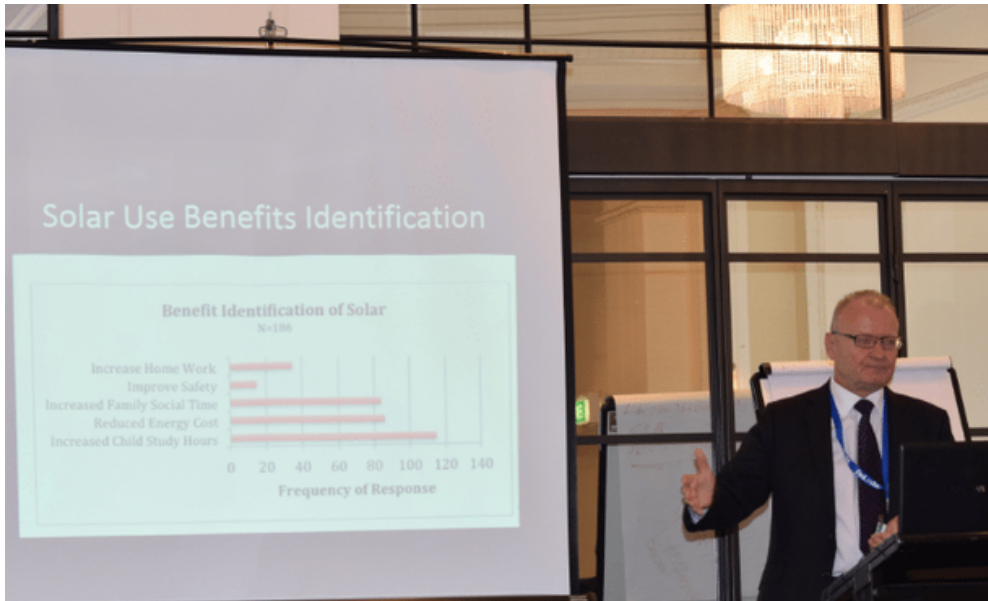


Work towards meeting family energy demands: The Panasonic solar lantern products are really useful and have benefited families, especially school-aged children; nevertheless, it was felt that a family's energy demands cannot be fully met with just one solar light. As a result, families indicated that they still continued to use other sources of energy, despite the fact that solar was now used. The upside, of course, is that solar allows for some reduction in the use of wood fuel and kerosene.

Strengthen working relationships with government entities: The solar lantern recipients said they were pleased to see that the local government fully supported this project, and assisted in identifying the poorest households to receive solar lighting. Moving forward, it was suggested that all stakeholders need to be intentional in strengthening their working relationships with government entities.

Build a stronger local maintenance infrastructure for solar lights: Another recommendation, as previously noted, is for LWD, JELA, and Panasonic to take steps to build the maintenance capacity for solar light repair, drawing upon resources and talent that is available at the grassroots level.

Final Remarks



Globally, over 1.2 billion people - including 3.3 million in Asia - do not have access to basic electricity to support daily household activities of cooking, child study, and income generation. In the absence of reliable electricity, people in developing countries depend on kerosene, batteries, and candles to provide for their lighting needs. Extensive research to date confirms that these non-electric energy sources are unhealthy and costly for 2.6 billion people, comprising 40% of the world's population, who live on less than two dollars a day.

Development professionals widely accept that access to efficient and affordable energy is a prerequisite to poverty alleviation and sustainable development. Our review supports how lighting in the home is a vital determinant of poverty alleviation because it enables essential activities (i.e., cooking, heating, and lighting), while enhancing child education, family health, and household micro-business activities. Panasonic's initiatives to provide solar lanterns to the "poorest of the poor" speak to the company's commitment to helping families - especially women and children - to have a brighter future through improved education and health.



Acknowledgements

Thank you to the many people who participated in meetings, interviews, and surveys to conduct the post-implementation review. This report was possible due to the good cooperation of the staff of Life with Dignity (LWD). We want to express our heartfelt appreciation to Ms. Heang Veasna and Mr. Chheng Samuth who worked with the local community to carry out the written survey and to gather additional information through focused group discussions and individual interviews. We are also thankful for the good support of the LWD Director, Mr. Suon Sopheap, and Mr. Try Kong, Head of Grant and Resource Mobilization.

We are especially grateful to the members of the Panasonic Corporate Social Responsibility team, Mr. Naoyuki Tada and Mr. Kazuhito Wakahara, who provided valuable guidance in setting distribution criteria and assessment methodology. A special word of thanks to Mr. Yasunobu Matsumoto, Panasonic Cambodia Country Head, for his participation in the Solar Lantern Distribution Ceremony and ongoing encouragement.

This project would not have been possible without the compassionate support of Panasonic Japan.

Finally, we would like to thank members of the JELA Foundation administrative team who participated in on-site visits in 2022 and 2023, including Board Chair Mr. Shiro Furuya, Director Ms. Kaoru Watanabe, and Asia Program Manager, Mr. Shimpei Narabu. It has been a privilege for us to work together with Panasonic Corporation and LWD to help children in need.



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