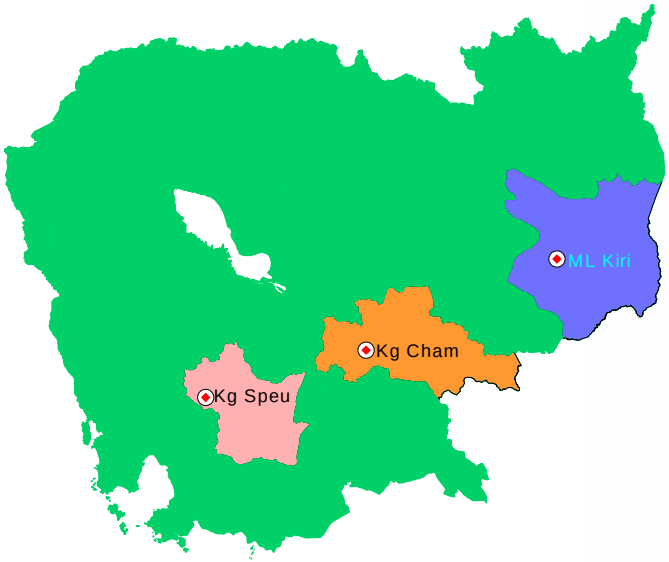
Crown Agents

SE Asia Community Access Program
Time & Distance Study
CAMBODIA

Topline Report
December 2006



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Introduction: Objectives, Methodology, General Sample Characteristics

Introduction

Research Background

SEACAP aims at improving the quality of statistical data for travel indicators and at developing a technical guidance note on the relative and absolute reliability and accuracy of time and distance reports.

The present survey has been conducted in 3 diverse settings in Cambodia to develop technical guidance for the World Bank & SEACAP in designing surveys which are to include relevant and effective questions on travel time and distance. Together with a parallel survey in Laos, this survey addresses the distance estimates made by respondents in terms of:

- **How reliable are reported distances as proxies of actual distances?**
- **How reliable are reported times as proxies of actual times?**
- **How can travel times be explained by travel distances?**
- **What is the impact of personal characteristics on reported & actual travel times?**
- **Which measure, time or distance, is recommended as probably more reliable and relevant under particular circumstances – and why?**
- **How should time and/or distance questions be best phrased in each survey?**

Introduction

Methodology

The survey sample was constructed by a four-stage process:

- **3 provinces were selected, covering the different terrain conditions of Cambodia:**
  - **Kampong Cham - Mostly flat & rural, Centre - East, 1890K inhabitants**
  - **Kampong Speu - Agricultural hilly terrain, Centre - West, 710K inhabitants**
  - **Mondulkiri - Mountainous, heavily wooded, East, 40K inhabitants**
- **For each province, 2 districts were selected:**
  - **1 containing the provincial capital or close to it;**
  - **1 more distant district (rural or remote).**
- **For each district, 10 villages were selected, in concentric circles:**
  - **2 at 0-5 km from the district centre; 2 at 5-10; 2 at 10-15; 2 at 15-20; 2 at more than 25 km.**
- **For each village, 10 households were randomly selected. 1 respondent per household was finally randomly selected, with the following stratifications (proportional to population):**
  - **Gender**
  - **Age groups: 13-18, 19-24, 25-34, 35-44, 45+.**

Thus the sample was 100 per district, Cambodia N = 600.

The survey used face-to-face interviews, based on a structured closed questionnaire. Fieldwork was conducted between July 6th and July 29th 2006 (severe flooding in Mondulkiri forced the choice of districts.)

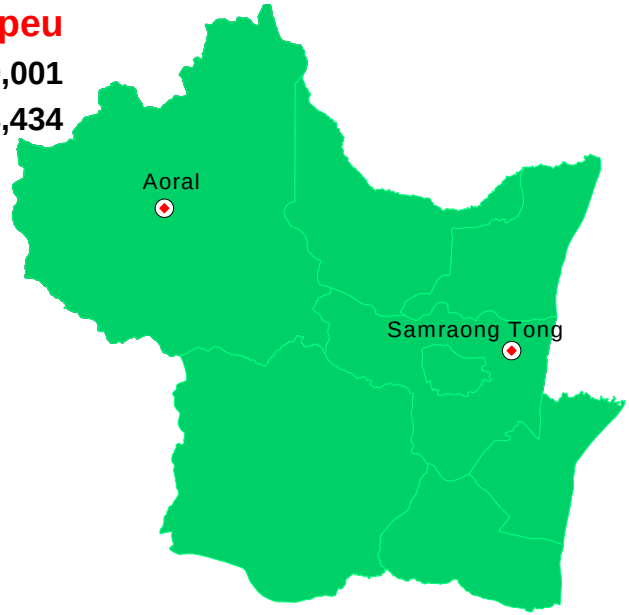
Introduction

Sample Districts

Kampong Speu

Samraong Tong - N=100 - inh. 139,001

Aoral - N=100 - inh. 18,434

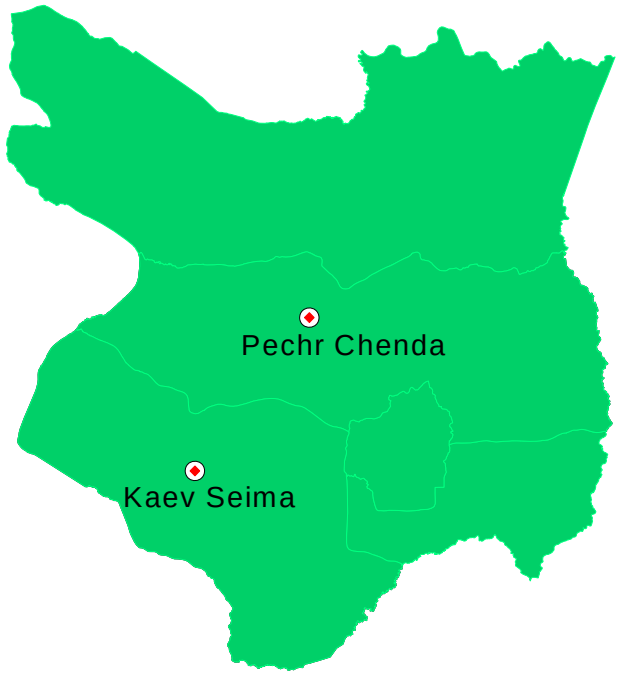


Kampong Cham

Kampong Siem - N=100 - inh. 116,545

Memot - N=100 - inh. 130,946

For all three provinces, the first district is close to the capital, and rural (i.e., accessible by road). In Kg Cham and Mondulkiri, the second district too is accessible by road.



Mondulkiri

Pech Chenda - N=100 - inh. 6,035

Kaev Seima - N=100 - inh. 8,584

General Characteristics

Sample Profile

Gender	
Male	49%
Female	51%

Age group	
13 to 18	20%
19 to 24	20%
25 to 34	20%
35 to 44	21%
45 and over	19%

Province by type of district	
Kampong Cham rural	100%
Kampong Cham remote	0%
Kampong Speu rural	52%
Kampong Speu remote	48%
Mondulkiri rural	100%
Mondulkiri remote	0%

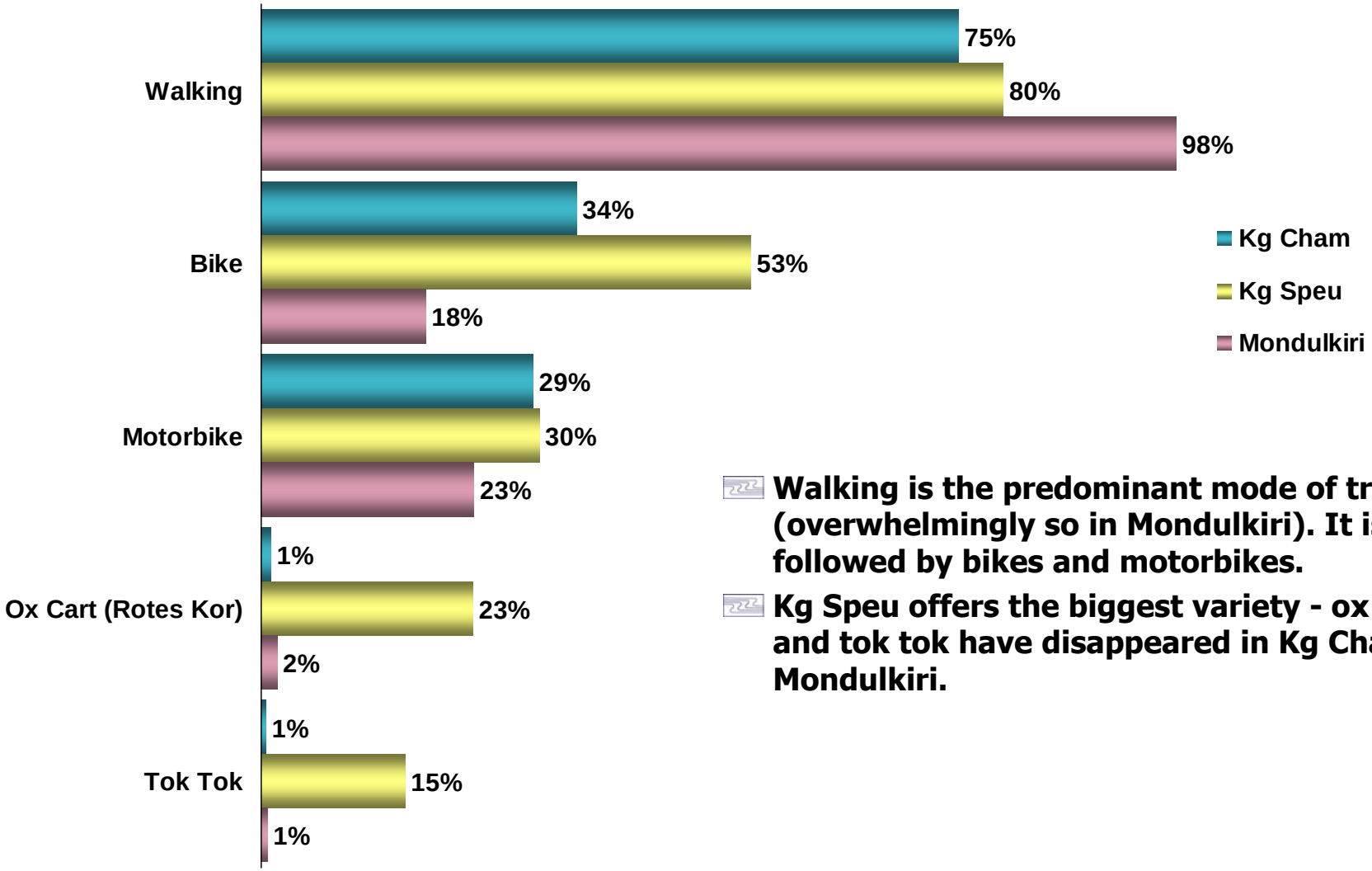
Education	
Some primary school	49%
Completed primary school	6%
Some secondary school	15%
Completed secondary school	2%
No formal schooling	28%

The sample is equidistributed by gender, and by age groups (40% are under 25). Education levels are quite low: nearly 4 out of 5 have not completed primary school, and more than a quarter have never been to school (vs 2% of completed secondary).

It is relevant to data interpretation that all Kg Cham and Mondulkiri areas are reachable by road, whereas in Kg Speu half the interviewees live in areas with a very limited road system.

General Characteristics

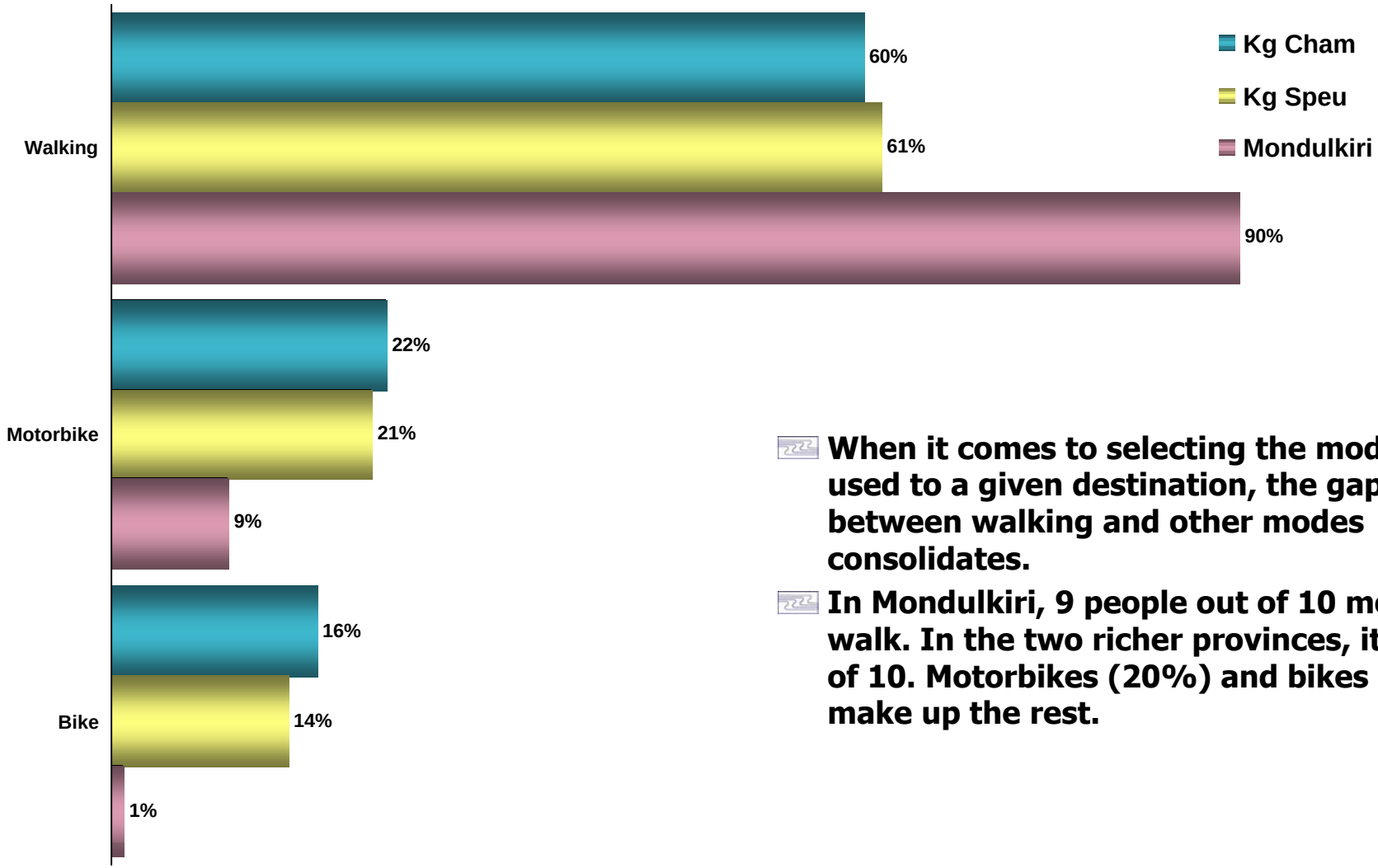
Overall modes of transport
By province



- **Walking is the predominant mode of transport (overwhelmingly so in Mondulkiri). It is followed by bikes and motorbikes.**
- **Kg Speu offers the biggest variety - ox carts and tok tok have disappeared in Kg Cham, and Mondulkiri.**

General Characteristics

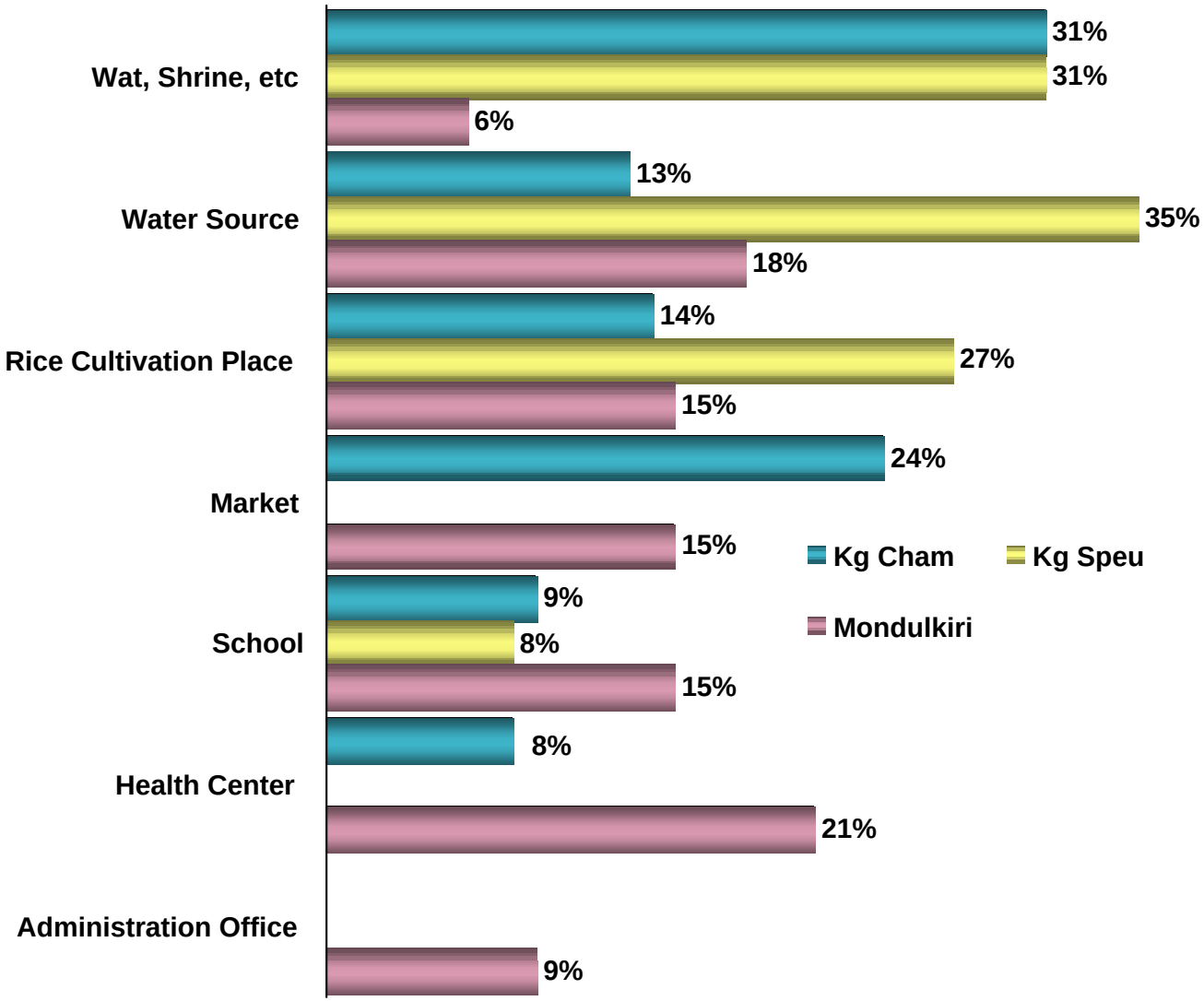
Most used mode of transport By province



- When it comes to selecting the mode most used to a given destination, the gap between walking and other modes consolidates.
- In Mondulkiri, 9 people out of 10 mostly walk. In the two richer provinces, it's 6 out of 10. Motorbikes (20%) and bikes (15%) make up the rest.

General Characteristics

Time From home ≠ Time To
By province



- All significant differences concern **walking**, and are spread across destinations; the most frequent differences are with wats and water sources (carrying loads respectively to and from?)
- In only 3 instances out of 21, however, times from a destination differ from times to the same destination by more than 30%.
- Admin offices have been visited only by 9 people in Kg Cham and 8 in Kg Speu (and 68 in Mondulkiri); they won't be used in the analysis.

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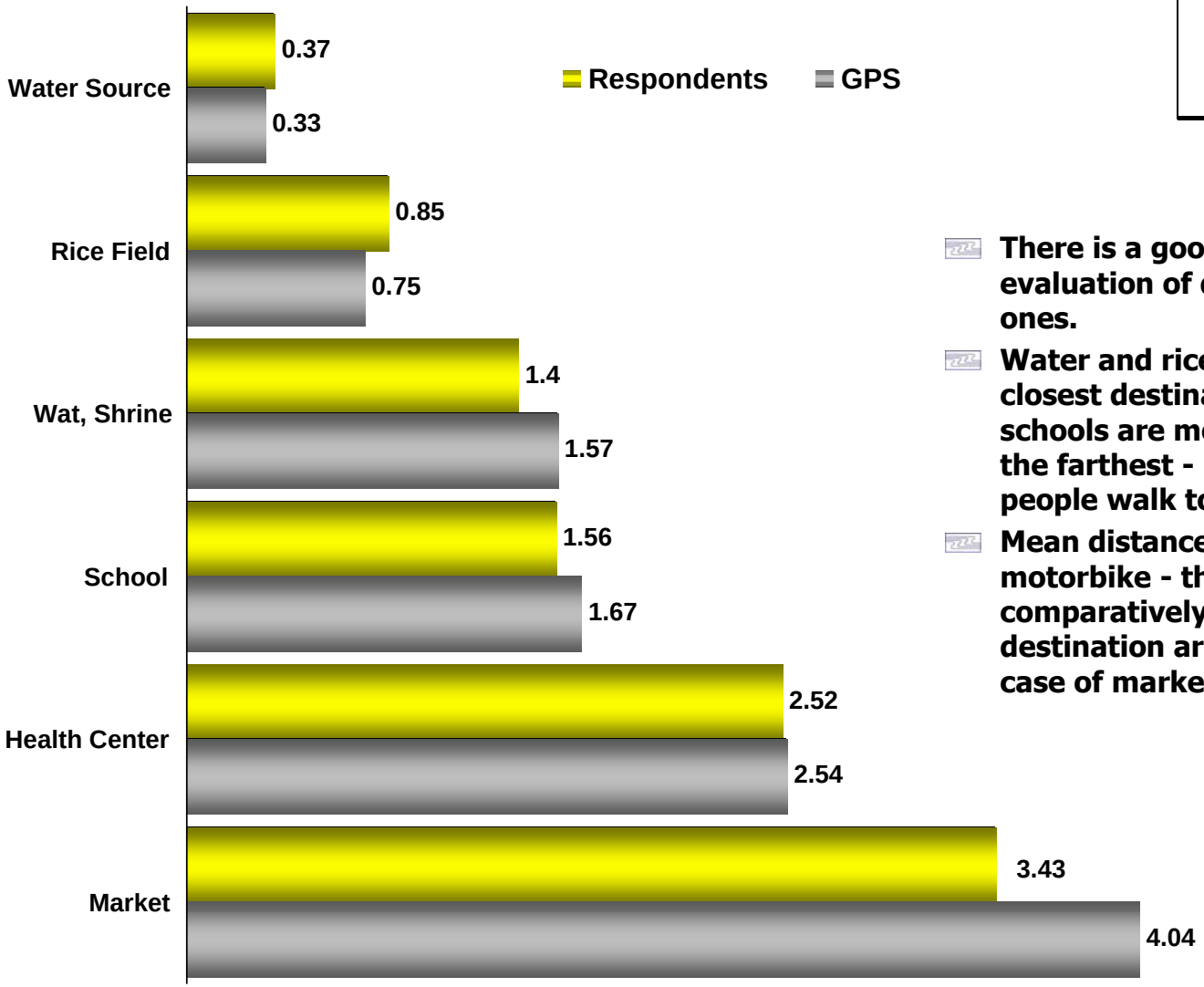
Part II
Kampong Cham

Kg Cham - distances

Mean distances FROM home TO… Respondents vs GPS (kms)

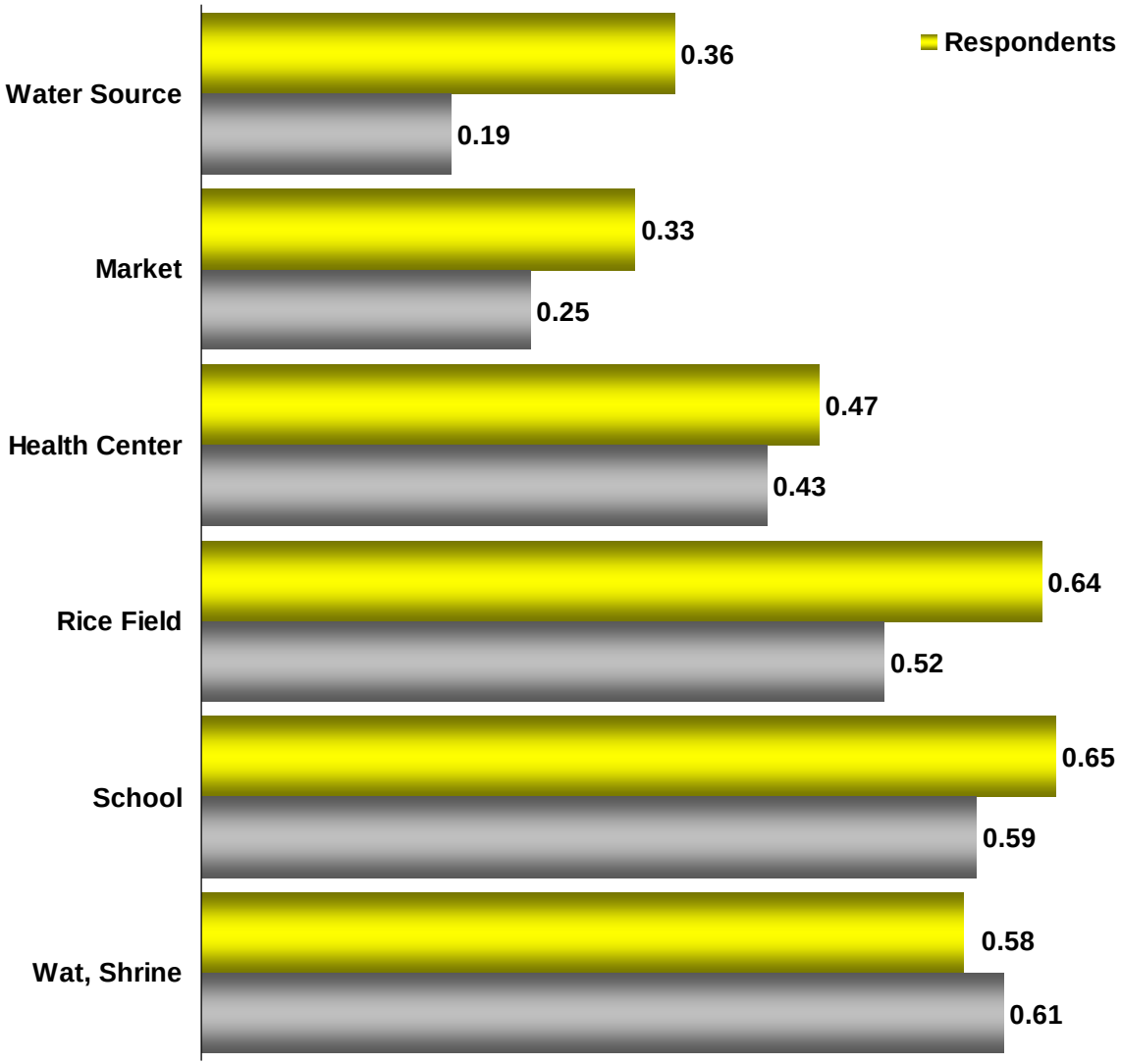


Kg Cham most used	
Car	1%
Bike	16%
Motorbike	22%
Walking	60%

- There is a good fit between respondents' evaluation of distances and GPS-measured ones.
- Water and rice paddies are on average the closest destinations; health centres and schools are more distant, and markets are the farthest - but on average only: when people walk to market, it's quite close.
- Mean distances aggregate walking and motorbike - thus very close and comparatively far instances of the same destination are bundled together (as in the case of markets).

Kg Cham - distances

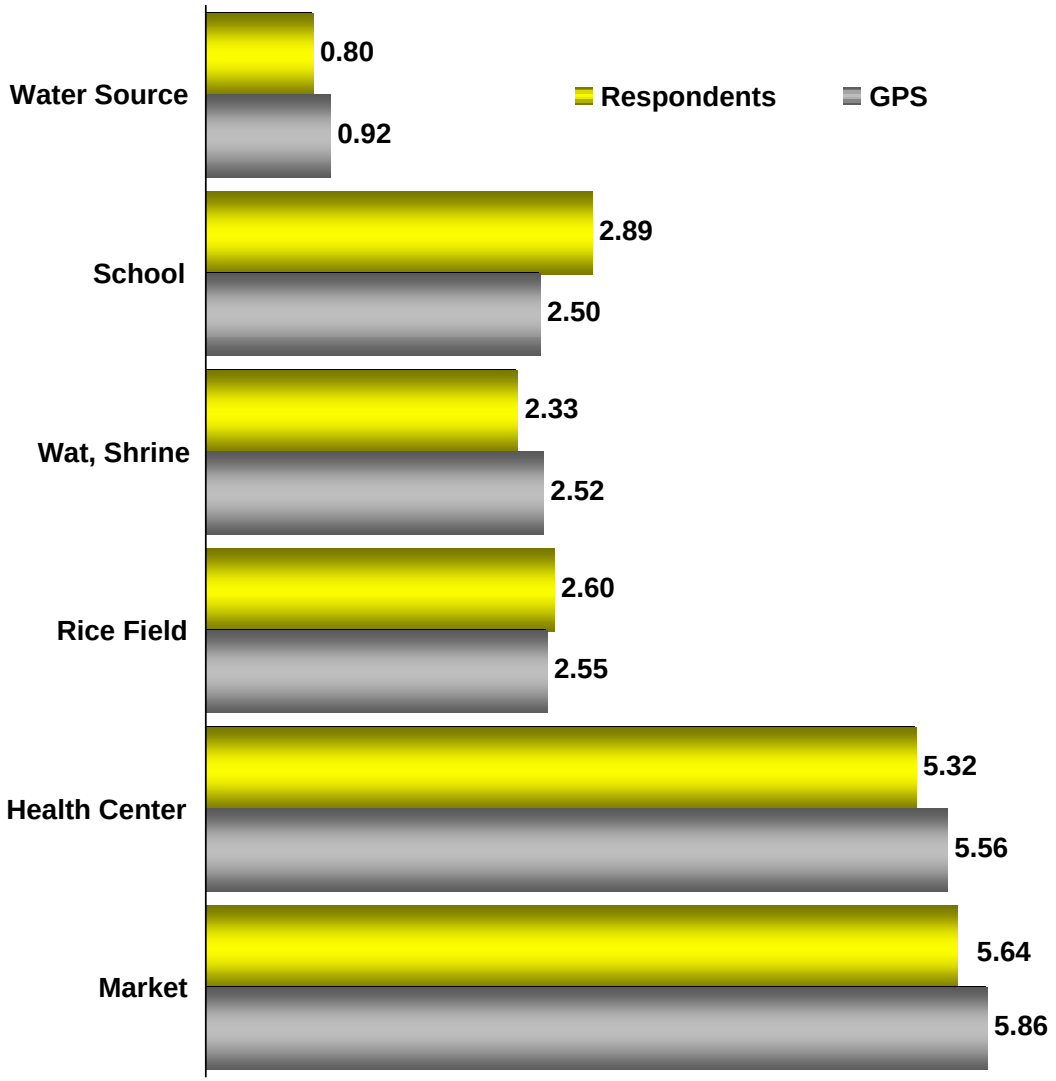
Walking (60%) FROM home TO… Respondents vs GPS (kms)



- This chart gives an image of the territory as perceived by most inhabitants. Distances are averages.
- Distances are all under 600m; thus errors, which are quantitatively low (170m at most), look deceptively high as percentages.
- On the whole, walking distances are overestimated - but it's easier to err by excess on short distances.
- The largest % differences between respondents and GPS concern water (respondents' estimate is GPS +89%) and rice (GPS +23%): they are the two most frequent destinations. And conditions of going and coming back are different.

Kg Cham - distances

Motorbike (22%) FROM home TO… Respondents vs GPS (kms)



- This chart applies to those who have largest distances to cover, and use a motorbike.
- The figures for water sources, rice paddies and school refer to 5 cases each and can be ignored.
- Other figures are more reliable (they are all slightly underestimated), and confirm that people recur to motorbikes only when the return distance 5 kms or more.
- There is on the whole a very good fit between respondents' estimates and GPS.

Correlation Matrix
- Explanation & Results Guide -

Correlation variables measure the relationship between different factors. Correlation can be thought of as representing the **extent to which a change in one particular factor will have an impact upon another factor, or group of factors**. Correlation influences are summarized as follows:

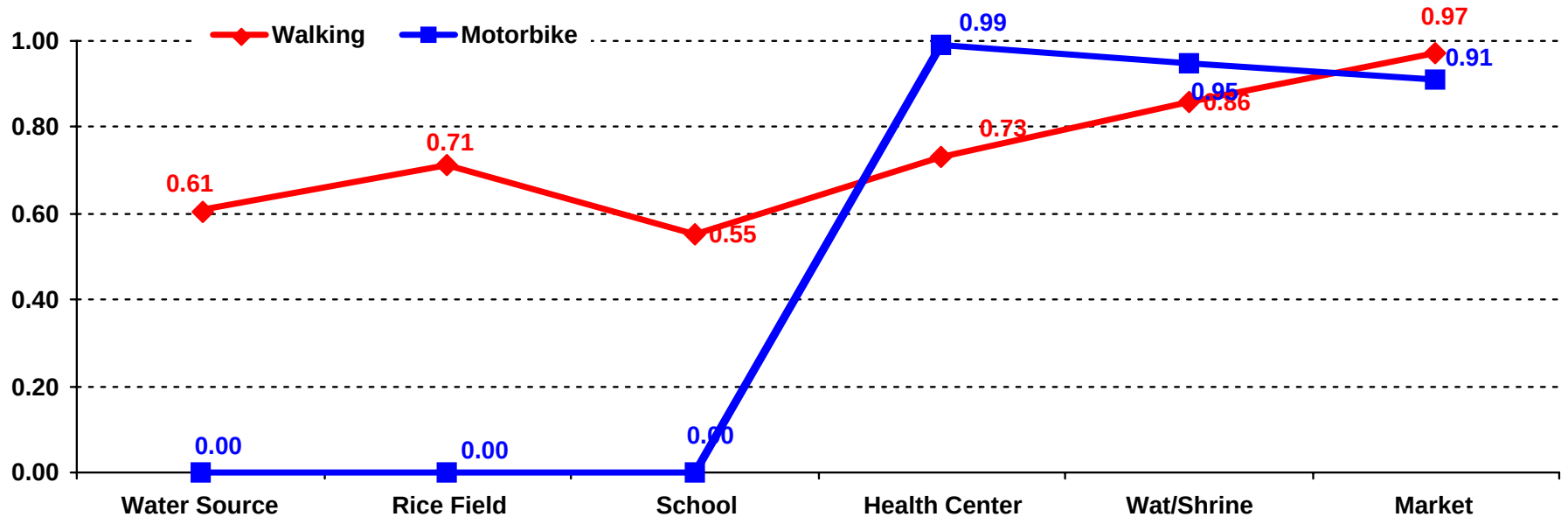
Equal Size & Equal Direction - this means that if one variable changes then a related variable will change in exactly the same way (e.g. if one variable increases by 1% then the related factor will also increase by 1%). This is said to be a "direct positive correlation".

Equal Size & Opposite Direction - this means that if one variable changes then a related variable will change in the inverse / opposite manner (e.g. if one variable increases by 1% then the related factor will decrease by 1%). This is said to be a "direct inverse correlation".

Proportional Size & Direction - this means that if one variable changes then a related variable will also change but not in exactly the same manner. In other words the related variable may increase or decrease by an amount that is some proportion of the change in the original factor. (e.g.. If one variable increases by 1% then the related factor may increase by 0.37% or decrease by 0.18% depending upon what the relationship or correlation is between the two factors. This is said to be a "proportional correlation".....this relationship is shown in the following tables...

Kg Cham - distances

Correlation FROM home To...
Respondents vs GPS

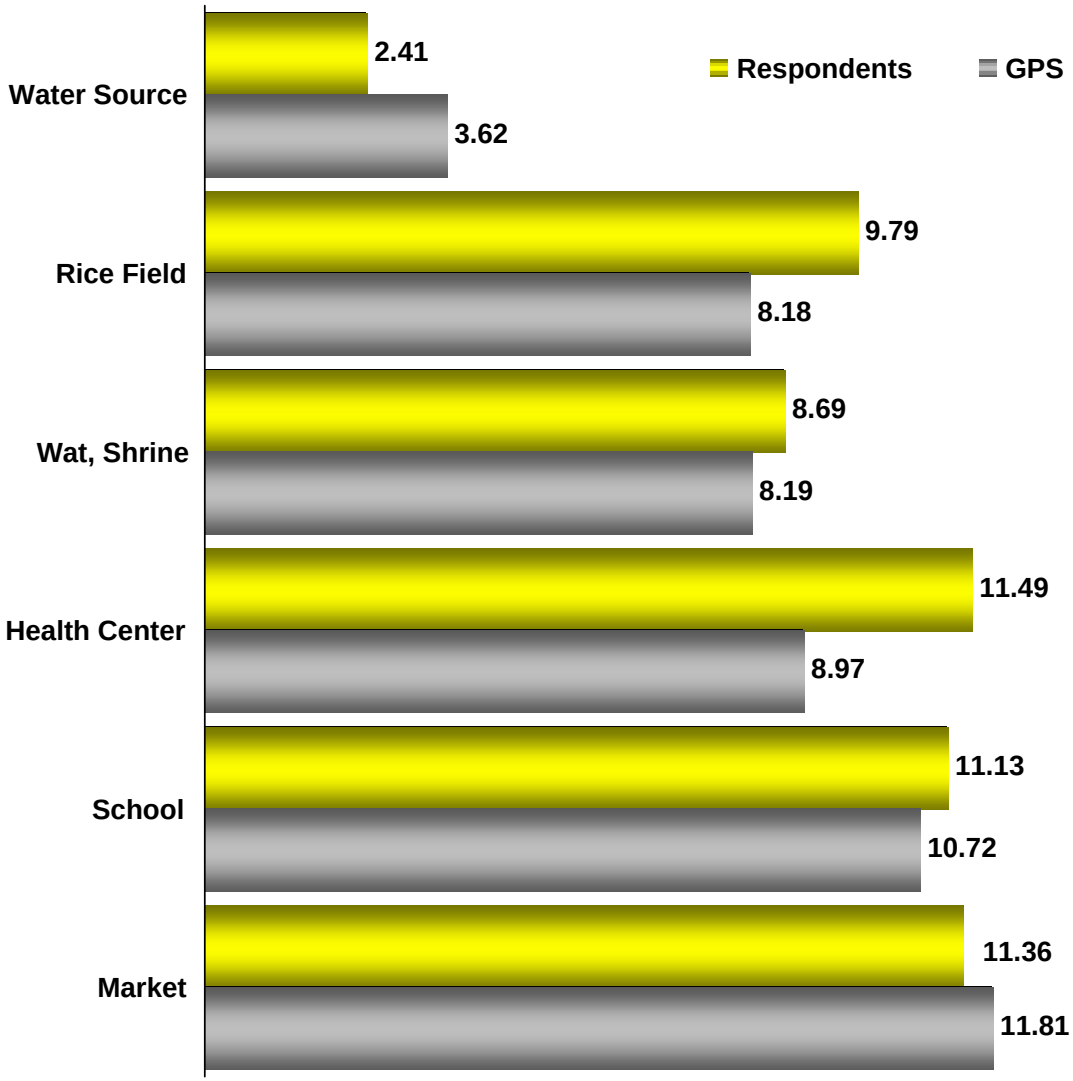


- **The two correlation graphs are quite close: it means that Kg Cham interviewees have on the whole a good perception of distances (absolute differences with GPS distances are also quite small), independently from the transport they use.**
- **Walking. There is a high or very high correlation between respondents' and GPS walking distances to all destinations but school (in other words, the value of respondents' distances increases in close proportion to the increase of real distances). It is obviously not dependent on distance (on foot, schools, wats and HCs are comparatively far - 600m at most).**
- **Motorbike. Even ignoring school, water and rice, correlations are extremely high. Estimated motorbike distances are here a good indicator of actual distance.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

Kg Cham - time From

Mean times FROM home TO… Respondents vs GPS (mins)

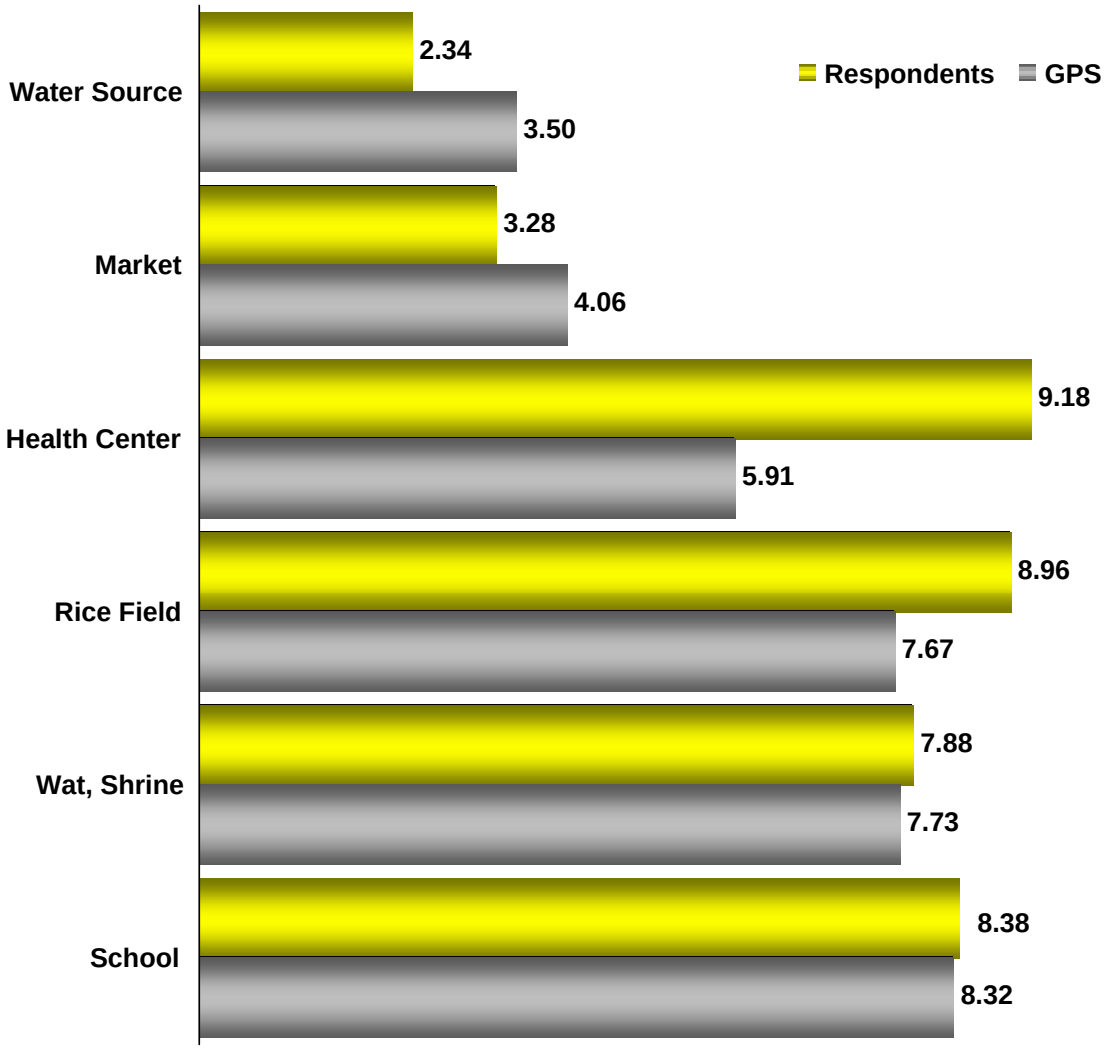


Kg Cham most used	
Car	1%
Bike	16%
Motorbike	22%
Walking	60%

- The mean times from home to destination fit overall the distribution of mean distances to destination.
- Respondents tend to overestimate the times.
- On the whole, Kg Cham interviewees seem fairly close to all destinations - between 4 and 12 minutes.
- The best mean correspondence between respondents and GPS is with markets.

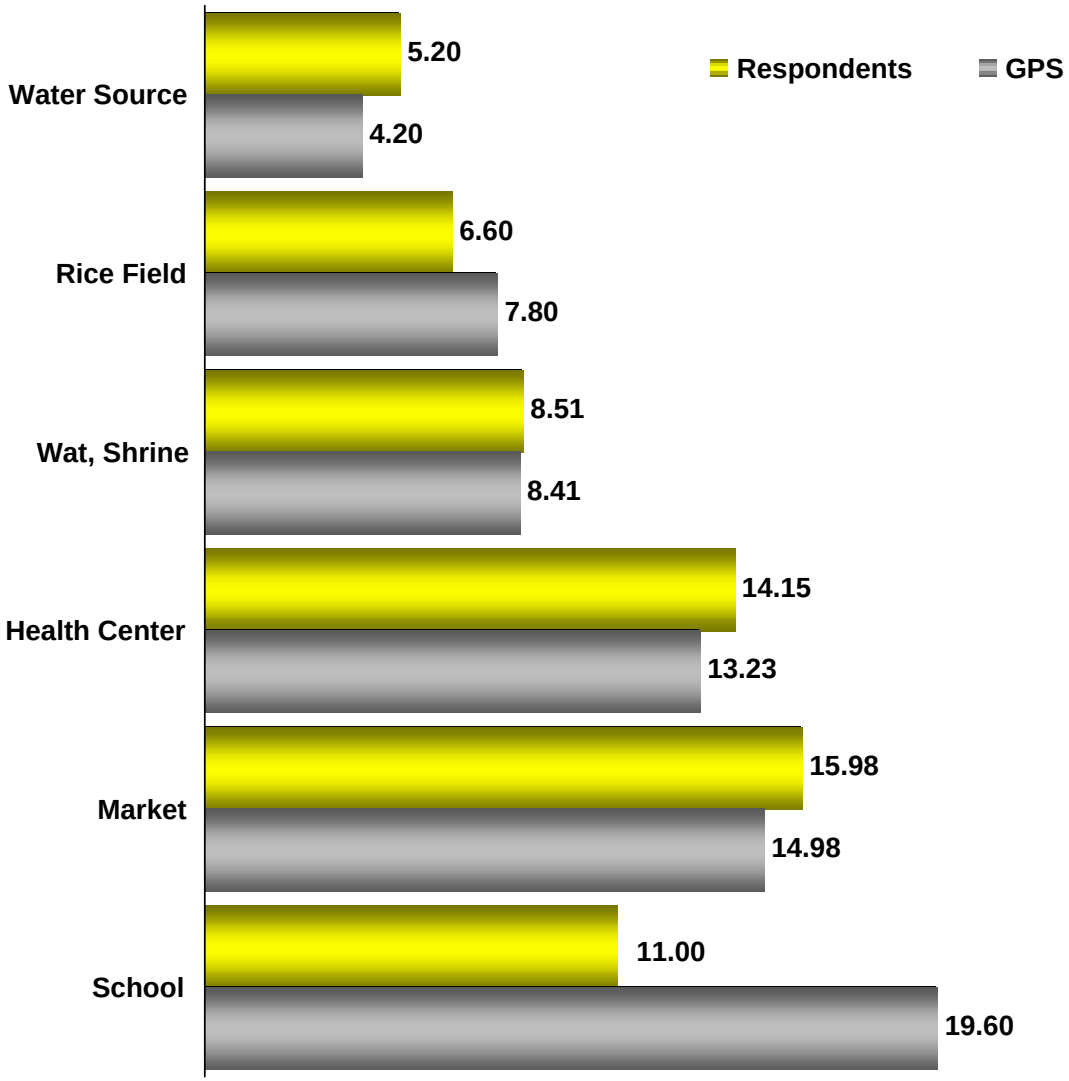
Kg Cham - time From

Walking (60%) FROM home TO… Respondents vs GPS (mins)



- Walking average times show on the whole a good fit with GPS measurements- but not as good as distances.
- Most walking times are overestimated - the exception being the shortest distances, water and markets.
- Inaccuracy seems tendentially to decrease with distance.

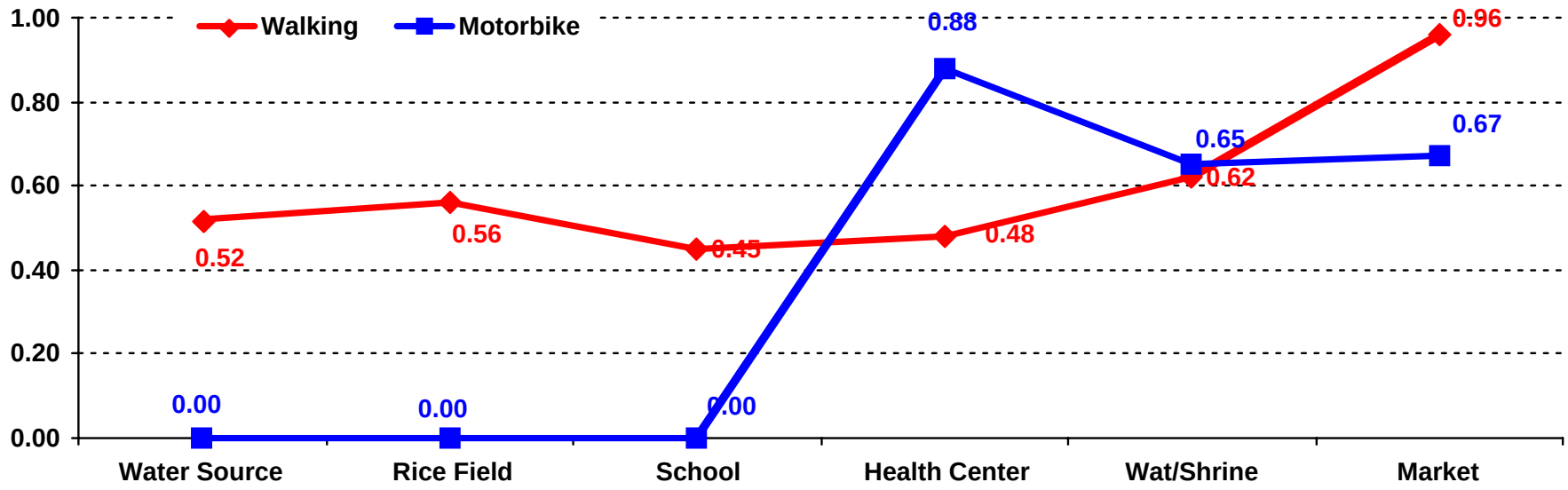
Kg Cham - time From Motorbike (22%) FROM home TO… Respondents vs GPS (mins)



- Absolute times of course increase, since a motorbike is needed for distances. School, water and rice should be ignored (5 cases each).
- In the reliable cases, respondents still tend to overestimate travel times, but less than when walking (not at all, in the case of wats).

Kg Cham - time From

Correlation FROM home To...
Respondents vs GPS



- **The two correlation lines are fairly close, and moderate or high: Kg Cham respondents have a good appreciation of time, with a tendency to overestimate. Motorbike times, when in sufficient numbers, are on average slightly more reliable.**
- **Walking. High or very high correlation between respondents' and GPS walking times to wats and markets. There is a moderate correlation for all other destinations. Walking times' correlations to GPS are lower than walking distances' correlations.**
- **Motorbike. School, water and rice paddies are ignored. High or very high correlations for wat, market and HC (and absolute errors were low).**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

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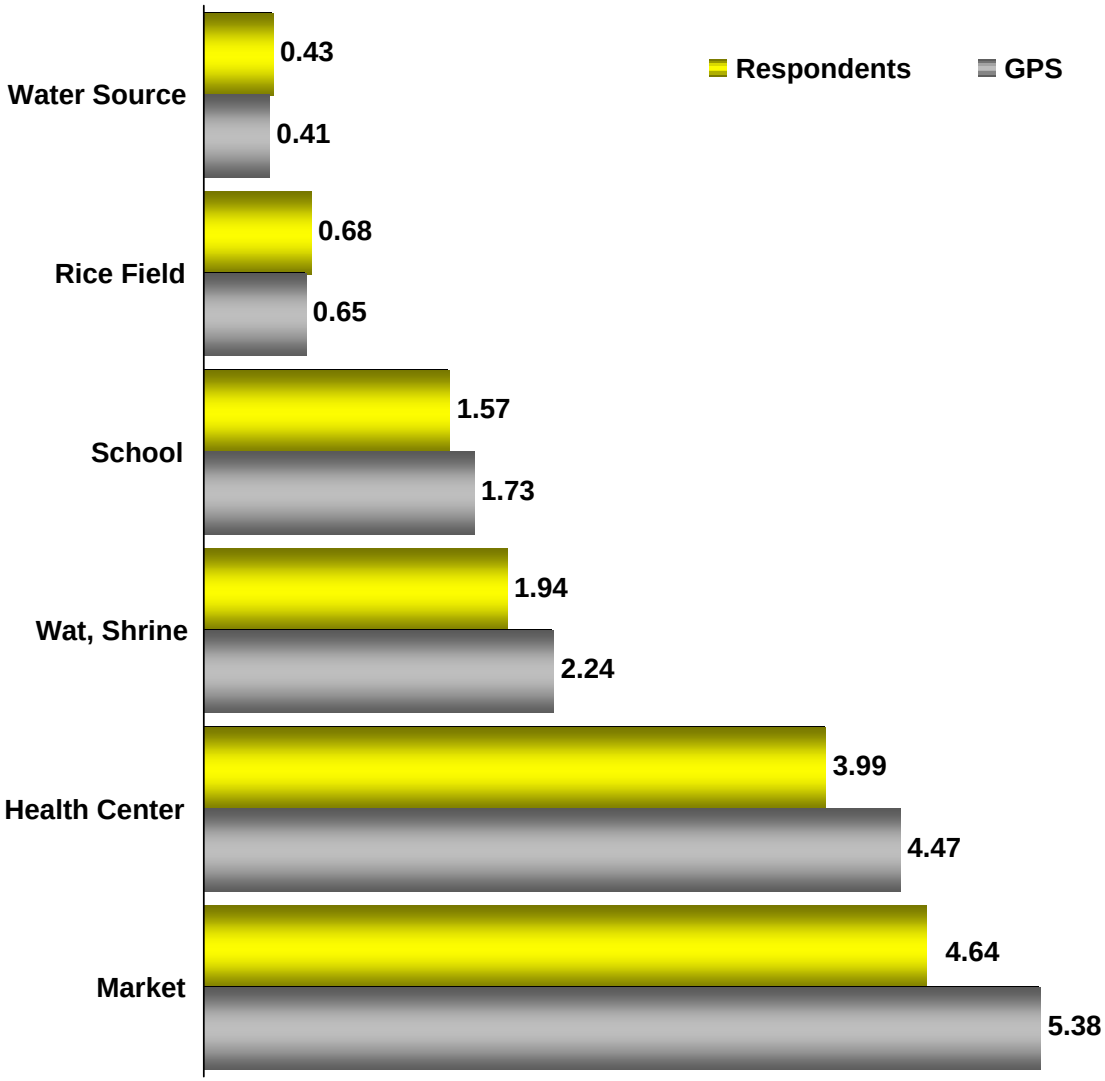
Part III
Kampong Speu

Kg Speu - distances

Mean distances FROM home TO… Respondents vs GPS (kms)

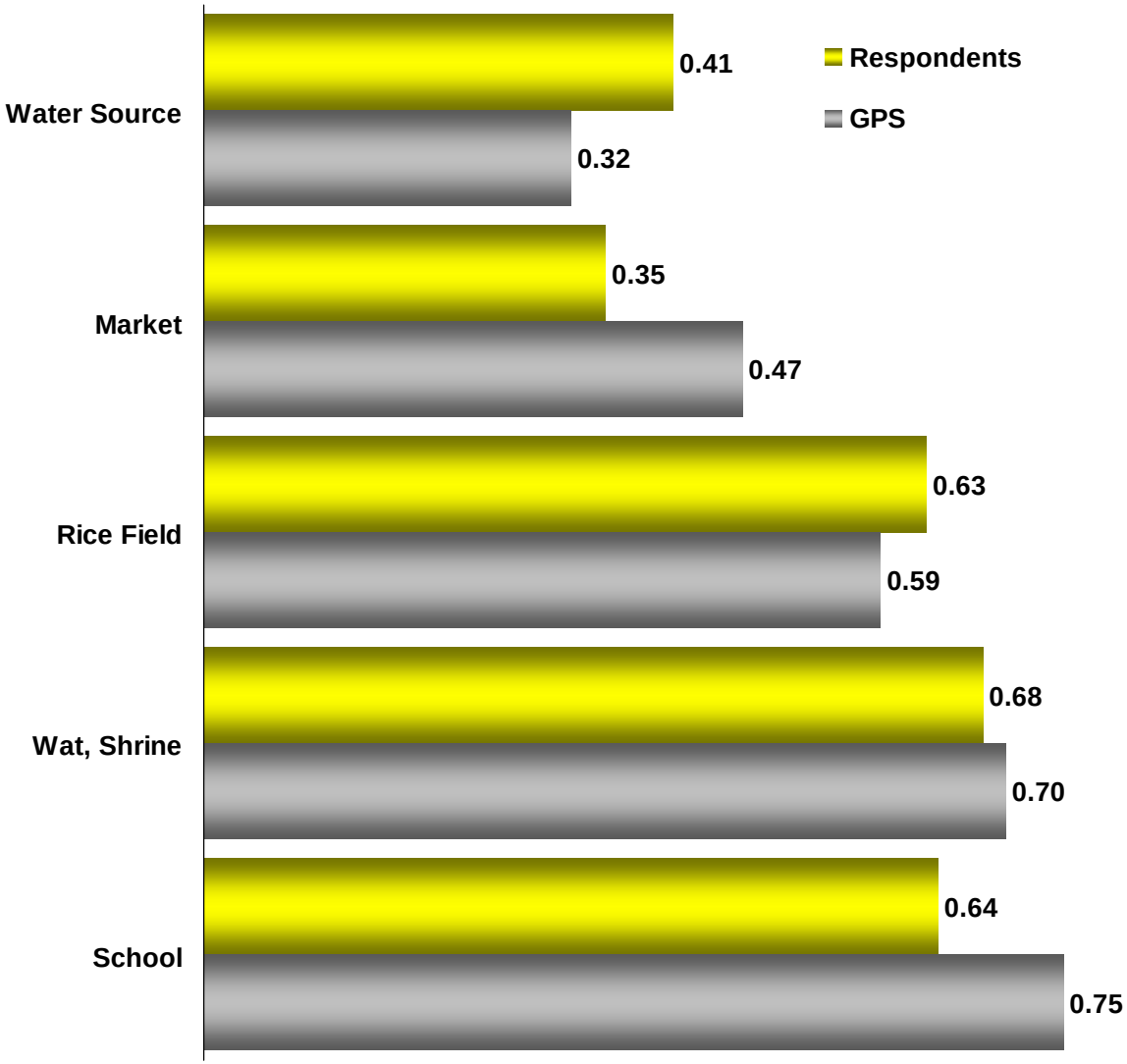


Kg Speu most used	
Tok Tok	3%
Bike	14%
Motorbike	21%
Walking	61%

- The distribution of average distances has water and rice fields very close, then schools and wats, then health centres and markets. (Only 8 people go to administration offices.)
- Compared to Kg Cham, health centres, schools and markets are more distant, because in Kg Speu one district is rural, and the other is remote.
- Again, mean distances aggregate walking, motorbike and other modes: the overall distance profile is however similar to the previous one.

Kg Speu - distances

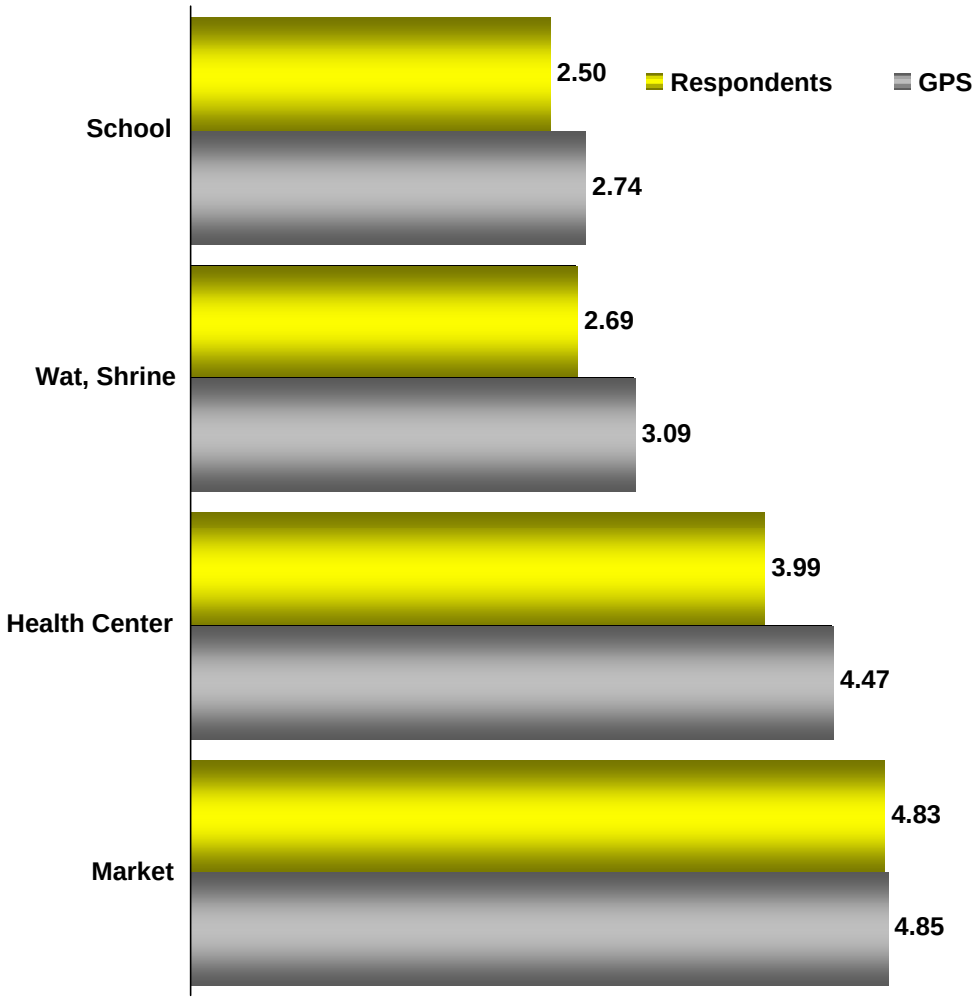
Walking (61%) FROM home TO… Respondents vs GPS (kms)



- Walking distances vary on average between 300 and 750 metres. (Health centres are too far to walk.)
- For those who walk to them, water sources and markets are the closest destinations.
- The largest percentage errors are, again, for the shortest distances (water +28% of GPS distance; market -25%). In absolute terms they are quite small.
- On the whole there is a good fit between respondents' estimates and actual distances - keeping in mind that the shorter the distance the greater a small error becomes in percentage terms.

Kg Speu - distances

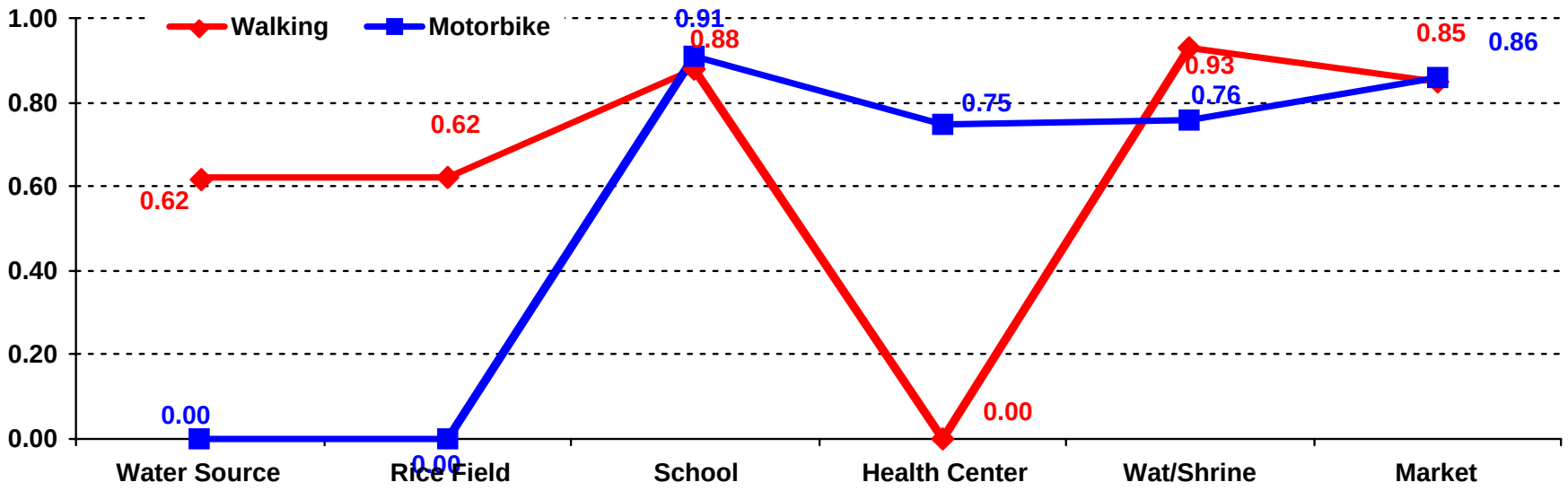
Motorbike (21%) FROM home TO… Respondents vs GPS (kms)



- The figures for most destinations are fairly similar. (Nobody goes to water or to rice by motorbike - it's close enough to walk.)
- Average distances vary between 3 and 5 kms.
- In Kg Speu too there is a good fit between respondents and GPS, with a tendance to underestimate distances. The biggest error margins are wat (-13% of GPS) and health centre (-11% of GPS).

Kg Speu - distances

Correlation FROM home To…
Respondents vs GPS

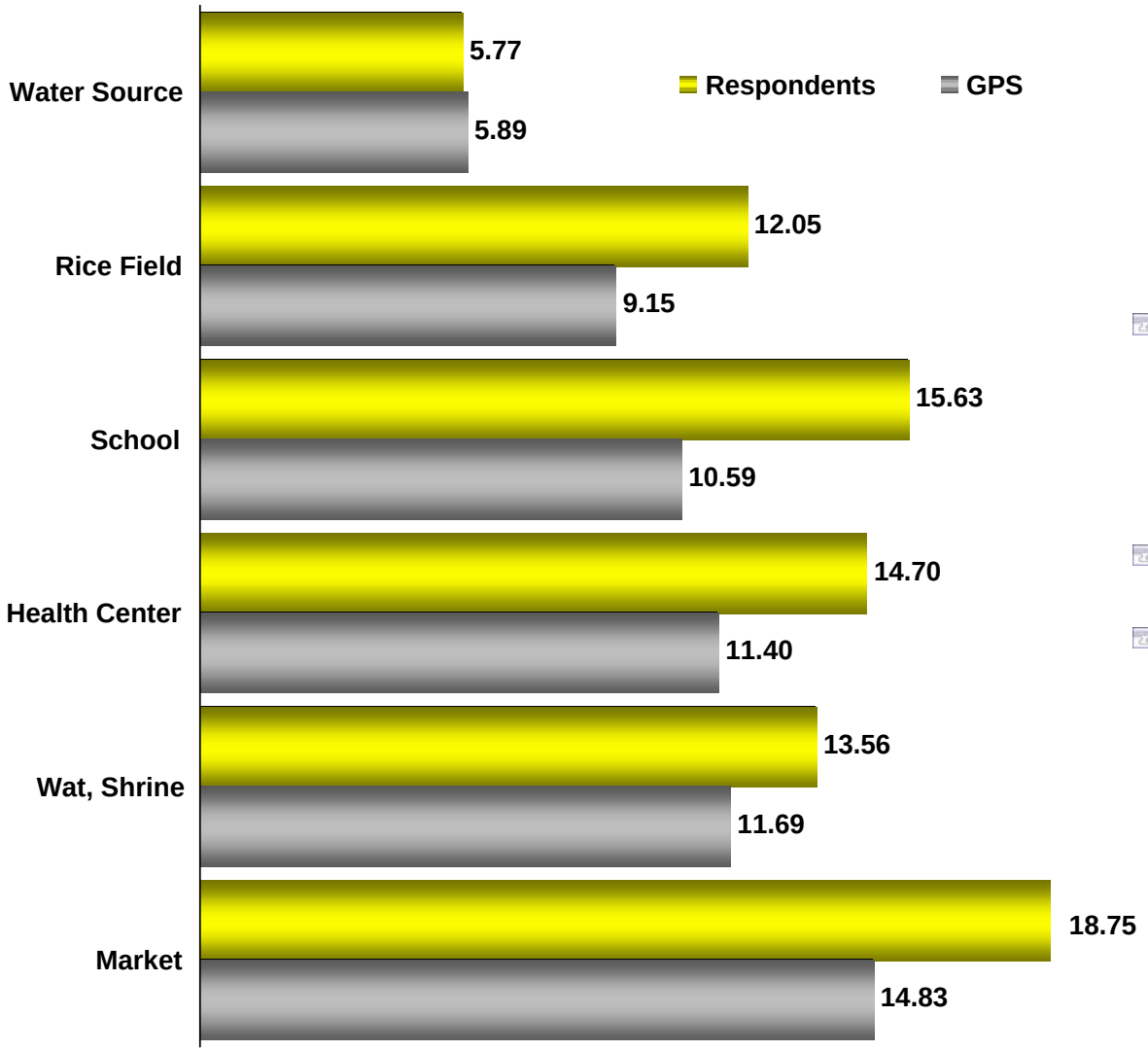


- **If we ignore the cases with very few or no respondents, correlations between perceived distances and GPS distances are quite good, although not as good as in Kg Cham.**
- **Walking. There is a high or very high correlation between respondents' and GPS walking distances for every destination they actually go to. It is not dependent on distance.**
- **Motorbike. Very high correlations for school, health centre, wat, market. Again, independent from distances.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

Kg Speu - time From

Mean times FROM home TO… Respondents vs GPS (mins)

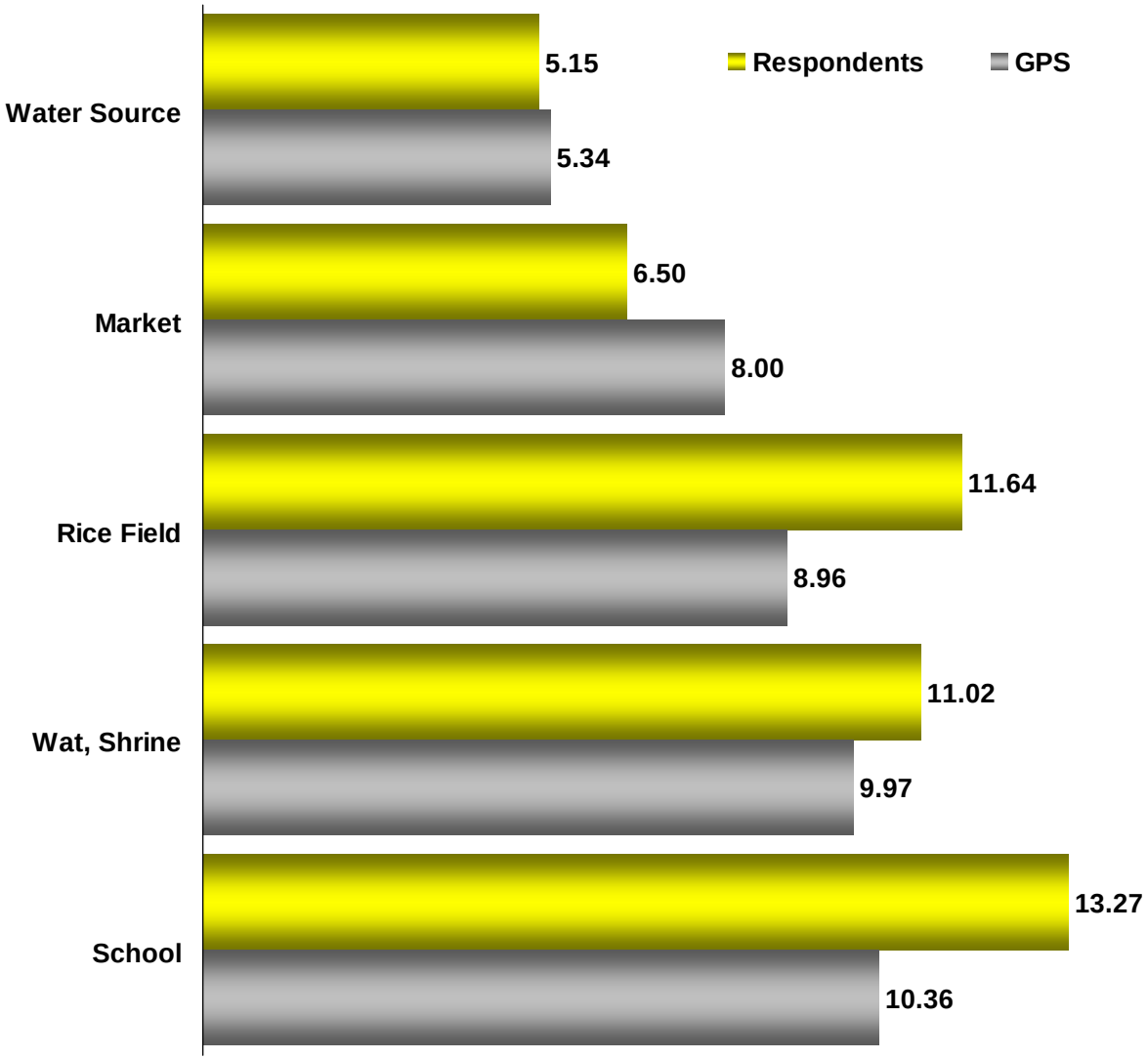


Kg Speu most used	
Tok Tok	3%
Bike	14%
Motorbike	21%
Walking	61%

- Here again, mean times from home to destination fit overall the distribution of mean distances to destination (taking into account that nobody goes to water by motorbike).
- Again, respondents regularly overestimate trip times.
- Reflecting the composite nature of the terrain of the two districts, in Kg Speu there is a gradual increase of times, which are all greater than in Kg Cham.

Kg Speu - time From

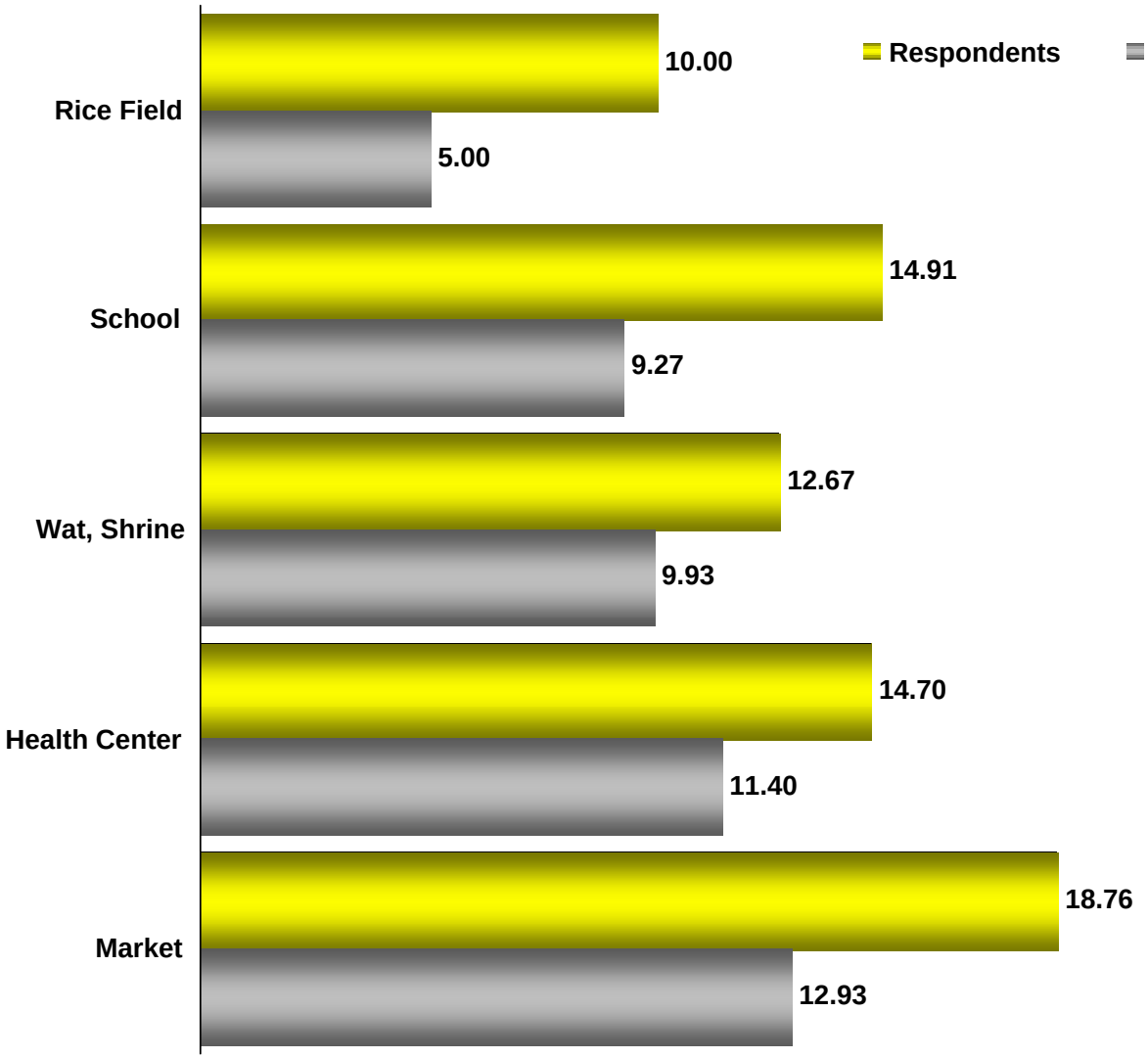
Walking (61%) FROM home TO… Respondents vs GPS (mins)



- Walking average times correspond overall with GPS times, but to a lesser extent than in Kg Cham.
- Respondents overestimate walking times by 28% of GPS for school and by 30% for rice paddies. On the other hand, the understimates for market and water are proportionally lower.
- Kg Speu's average times are the highest of the three provinces - this is attributable to the particularly impervious conditions of the Aural district.

Kg Speu - time From

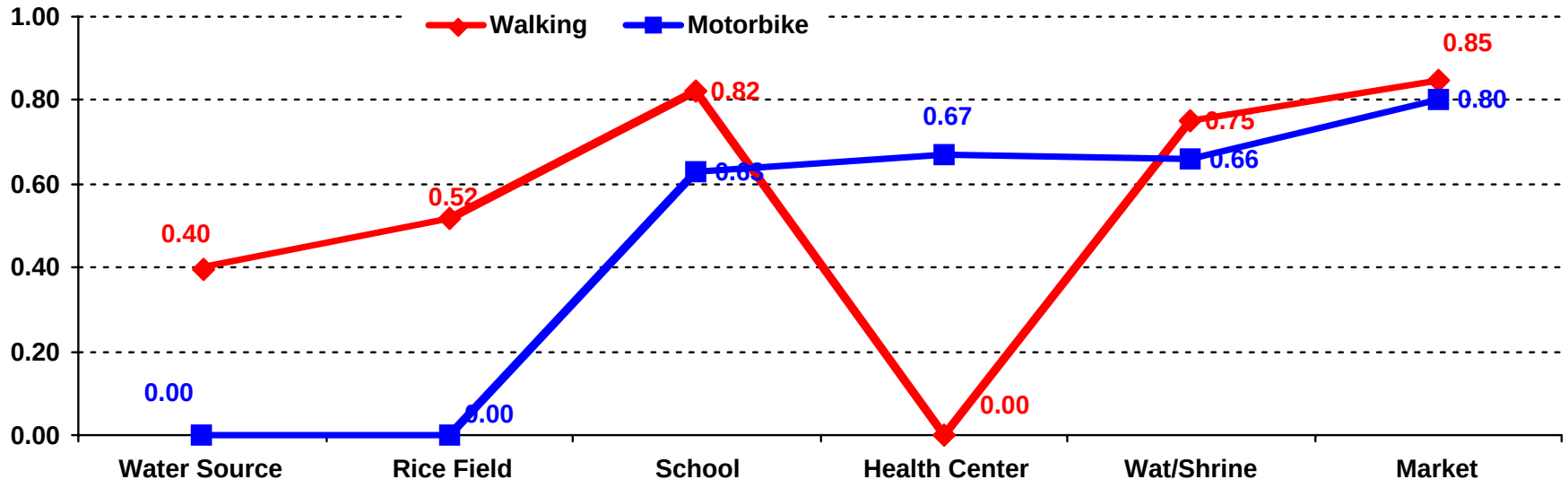
Motorbike (21%) FROM home TO… Respondents vs GPS (mins)



- Here again, motorbike use means absolute times increase (water disappears, and rice is 1 respondent).
- Respondents markedly overestimate travel times: between 61% and 28% of GPS times.
- Errors are higher than walking time errors (whereas in Kg Cham motorbike times were better approximations of real ones).

Kg Speu - time From

Correlation FROM home To…
Respondents vs GPS



- **The most interesting Kg Speu time correlation data are the similar profiles of walking and motorbike (excluding of course where data are absent or insufficient): however, in both cases we have a majority of overestimates**
- **Walking. There is high or very high correlation between respondents' and GPS walking times to school, wat and market. There is a moderate correlation for water and rice.**
- **Motorbike. Results parallel walking. High or very high correlations for school, wat, and market - and health centre.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

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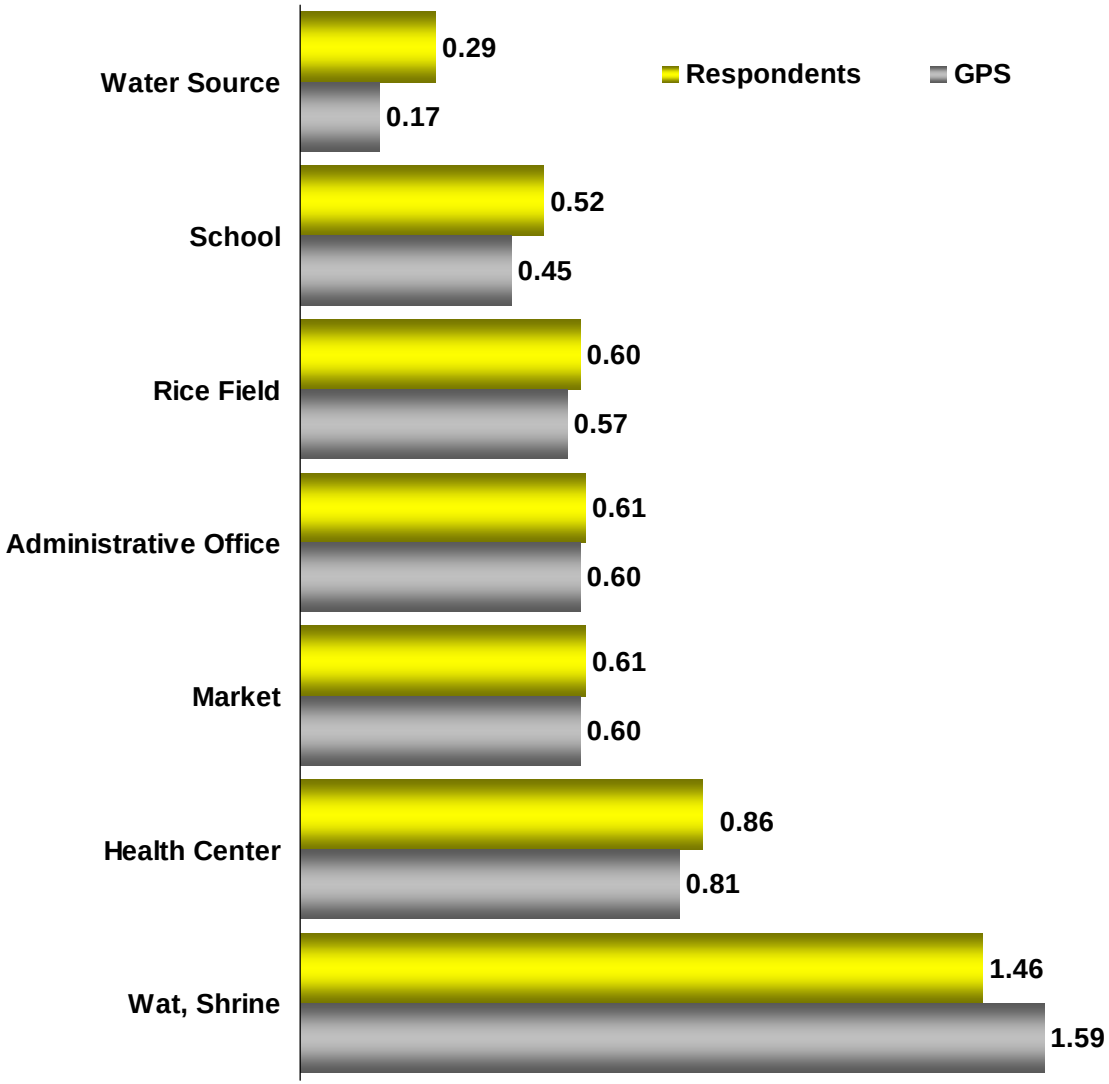
Part IV
Mondulkiri

Mondulkiri - distances

Mean distances FROM home TO… Respondents vs GPS (kms)

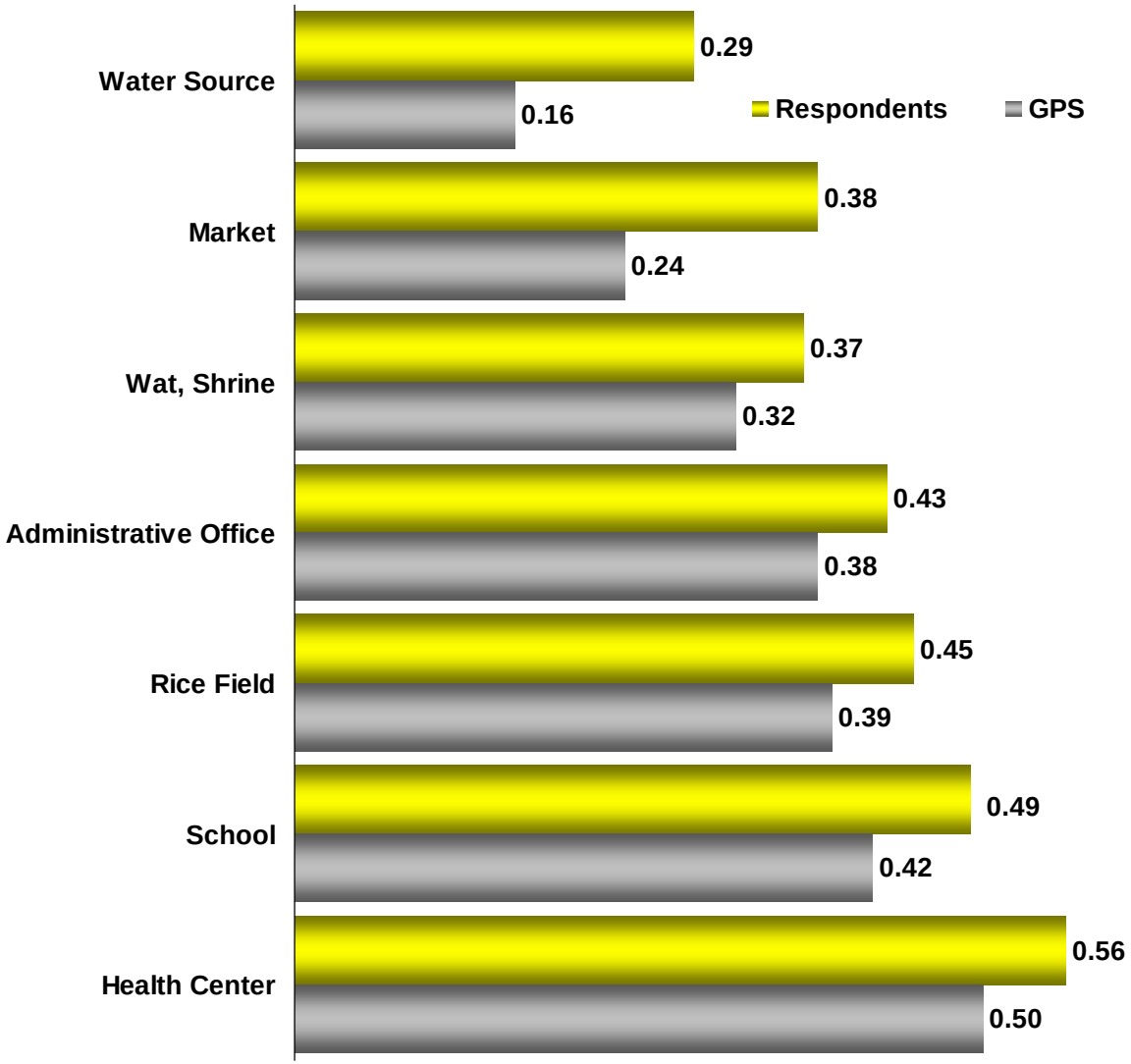


Mondulkiri most used	
Bike	1%
Motorbike	9%
Walking	90%

- In Mondulkiri the average distances' distribution changes slightly: wats are farthest, reflecting the fact that the majority of the province's population are animist.
- Administration offices are used more - because they provide a wider sort of services than in other provinces -, and are closer.
- Here, mean distances mean in practice only walking and motorbike.

Mondulkiri - distances

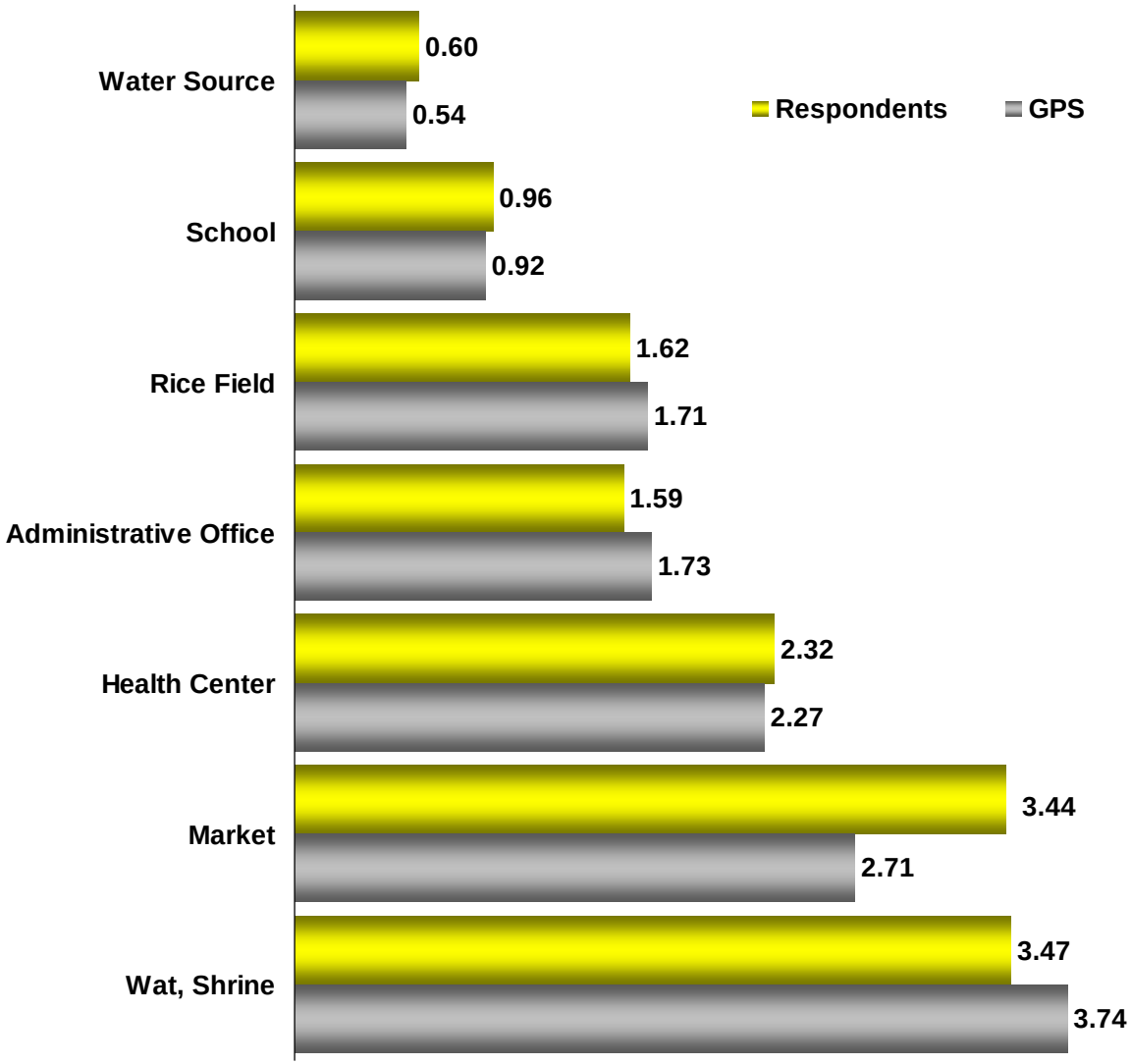
Walking (90%) FROM home TO… Respondents vs GPS (kms)



- Distances are averages, and represent the overwhelming majority of distances in Mondulkiri.
- For those who walk, water sources are, as elsewhere, the closest destinations; followed by markets, wats and administration offices. All walking distances are short (500m or less - in Kg Cham they were ≤600, in Kg Speu ≤750).
- Here again, the largest errors are on the shortest distances, both in absolute values and in percentages; there are no significant differences from the other two provinces.
- There is a good fit, but with a constant overestimation - which does not occur in the other two provinces.

Mondulkiri - distances

Motorbike (9%) FROM home TO… Respondents vs GPS (kms)

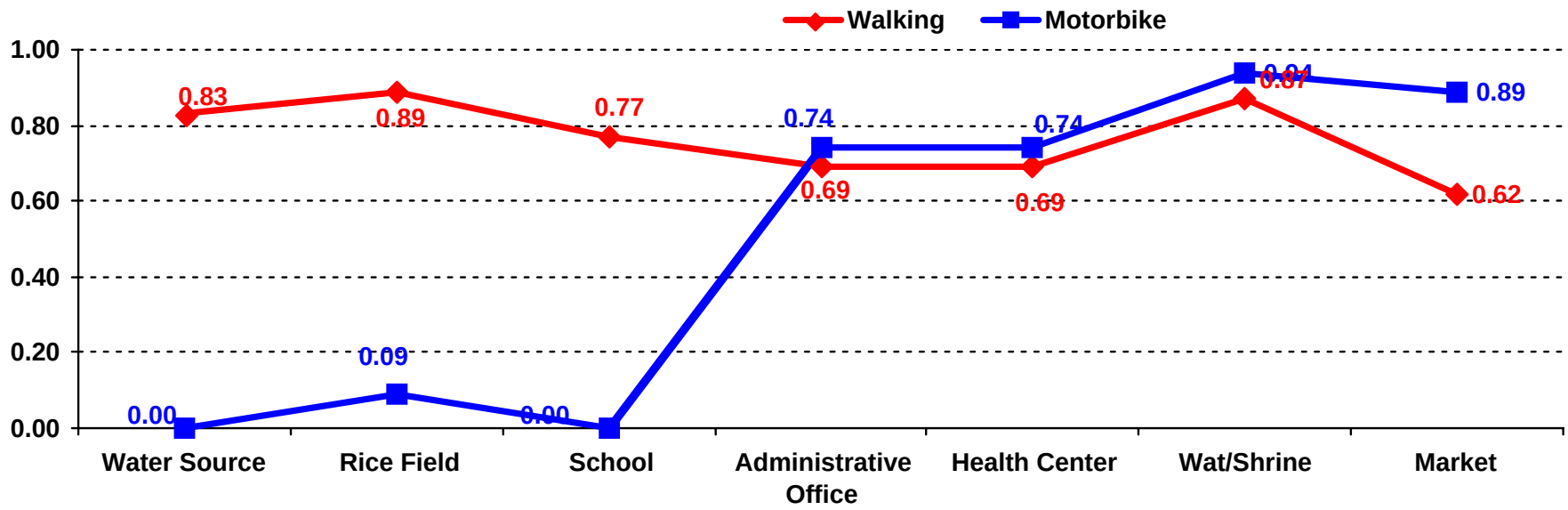


- The figures for water and school are 3 each - too low to be significant. Rice fields are also very low.
- Distances covered by motorbike are shorter than both Kg Speu and Kg Cham.
- In Mondulkiri there is a good fit between respondents and GPS - and not all distances are overestimated. However, data are limited.

Question 3a

Mondulkiri - distances

Correlation FROM home To…
Respondents vs GPS

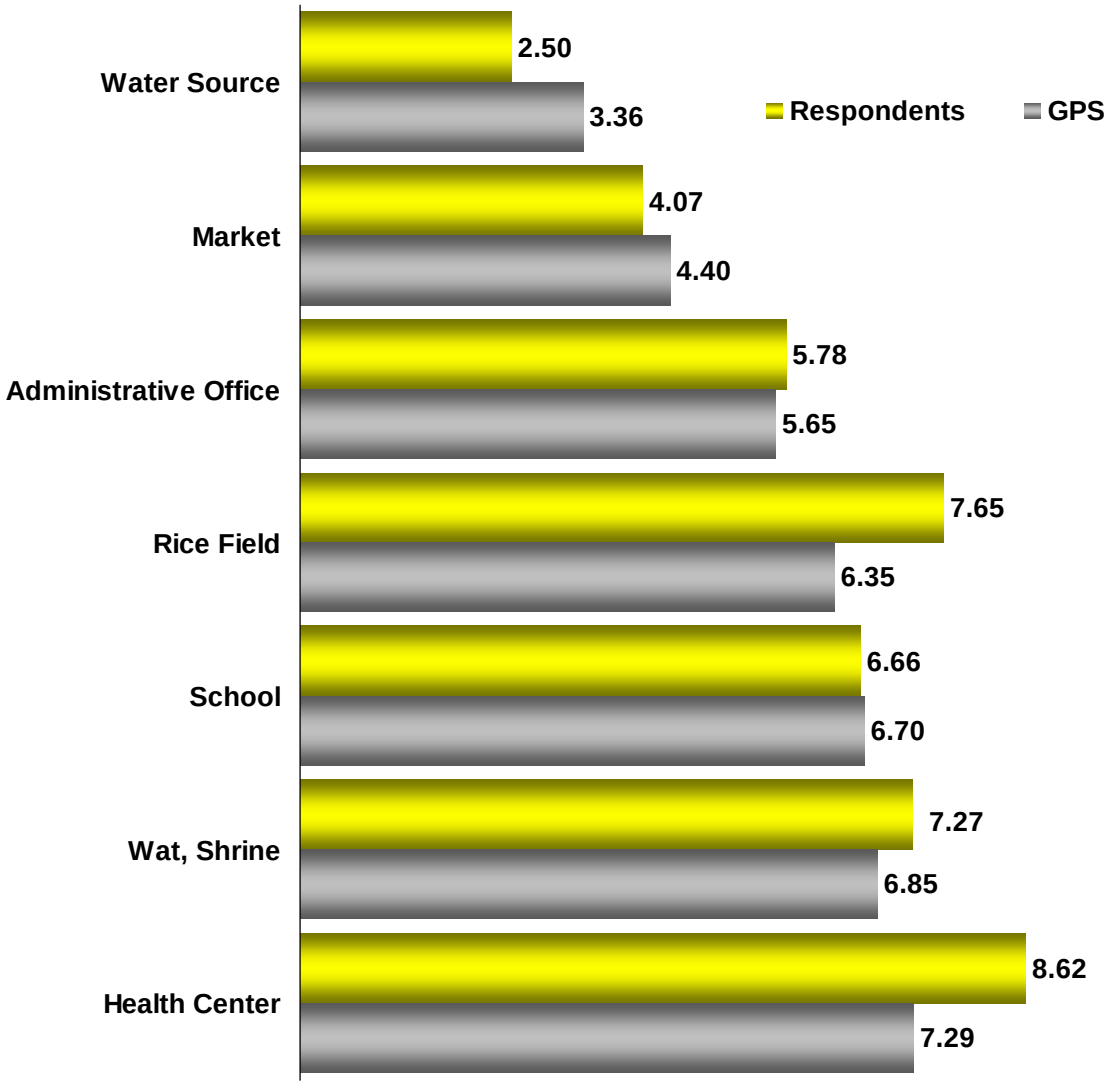


- **Mondulkiri's results show good distance correlation for all significant cases: closer to the leavel of Kg Cham than to Kg Speu.**
- **Walking. There is a high or very high correlation between respondents' and GPS walking distances to all destinations. It is independent from distance.**
- **Motorbike. High or very high correlations for all significant data, again independent from distance.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

Mondulkiri - time From

Mean times FROM home TO… Respondents vs GPS (mins)

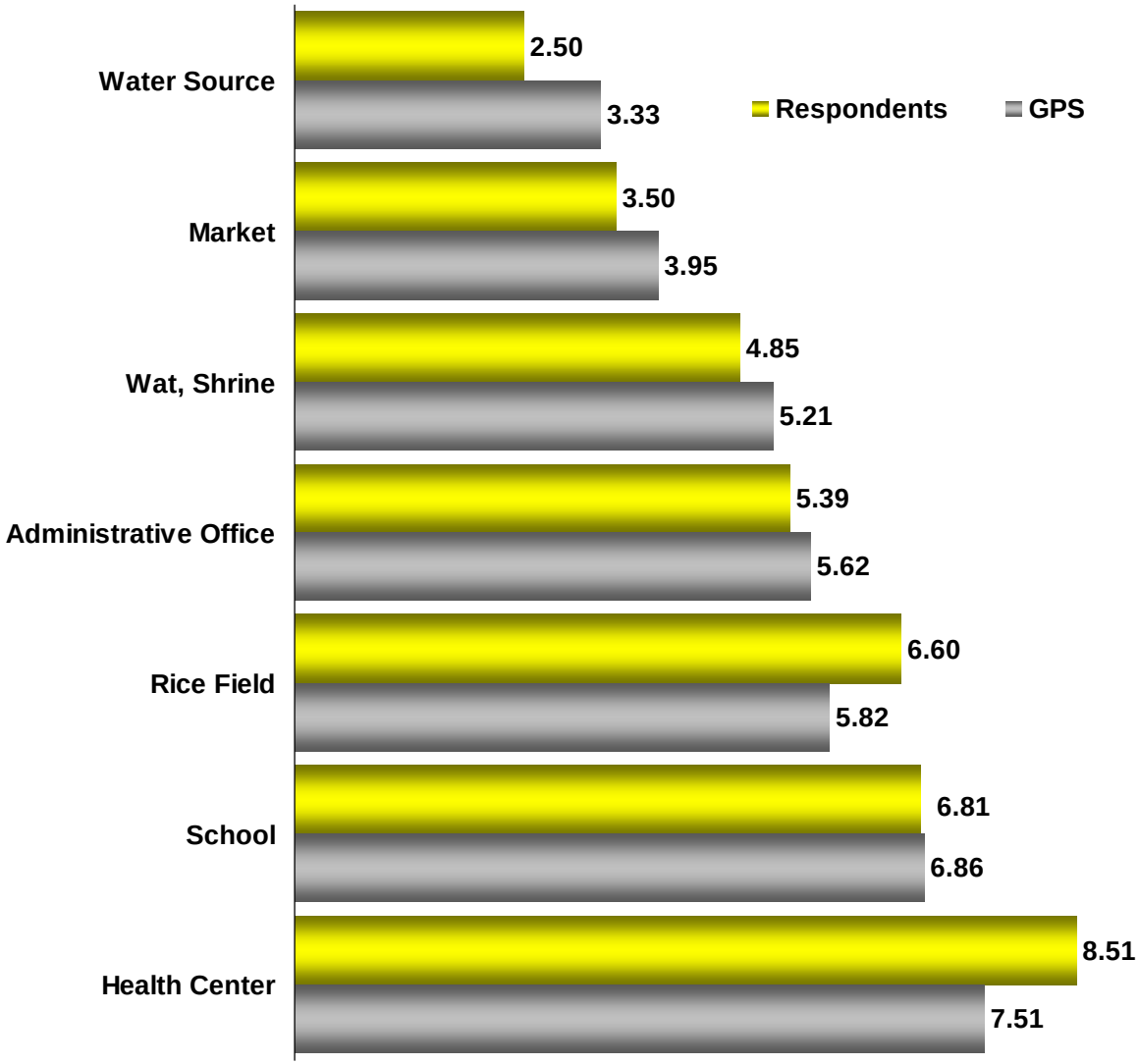


Mondulkiri most used	
Bike	1%
Motorbike	9%
Walking	90%

- There is a good fit between perceived times and GPS-measured ones.
- On average, the longest times are overestimated; this is explained by the fact that all motorbike times are overestimated.

Mondulkiri - time From

Walking (90%) FROM home TO… Respondents vs GPS (mins)

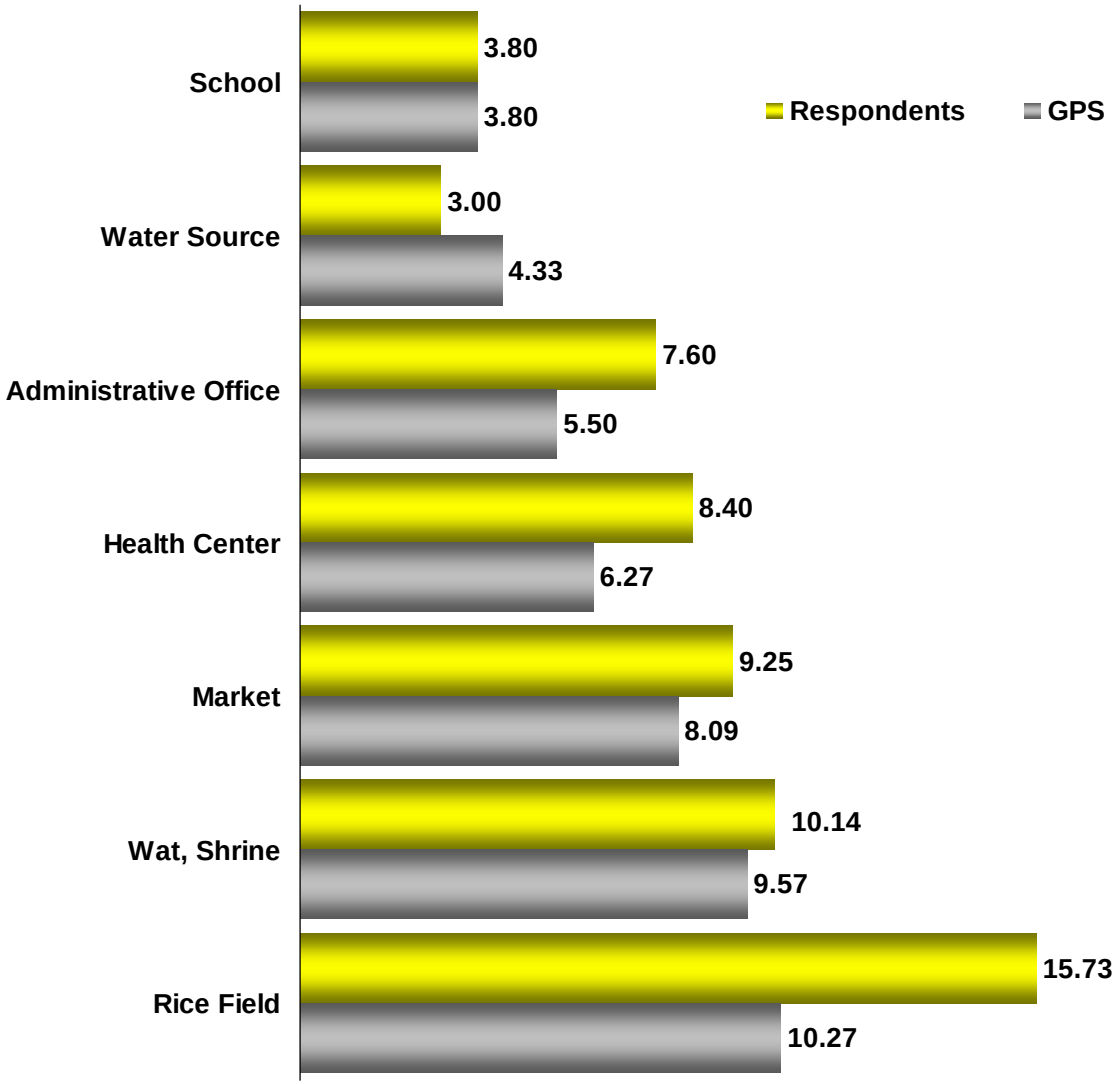


- Walking average estimated times have exactly the same profile than estimated distances.
- However, the times' estimates offer a closer approximation to GPS than distances. This is different from the other two provinces.
- Inaccuracy is proportionally greater on the shorter times
- Mondulkiri's average times are close to Kg Cham's - with the exception of water sources, which in Kg Cham are much closer.

Question 3b

Mondulkiri - time From

Motorbike (9%) FROM home TO… Respondents vs GPS (mins)

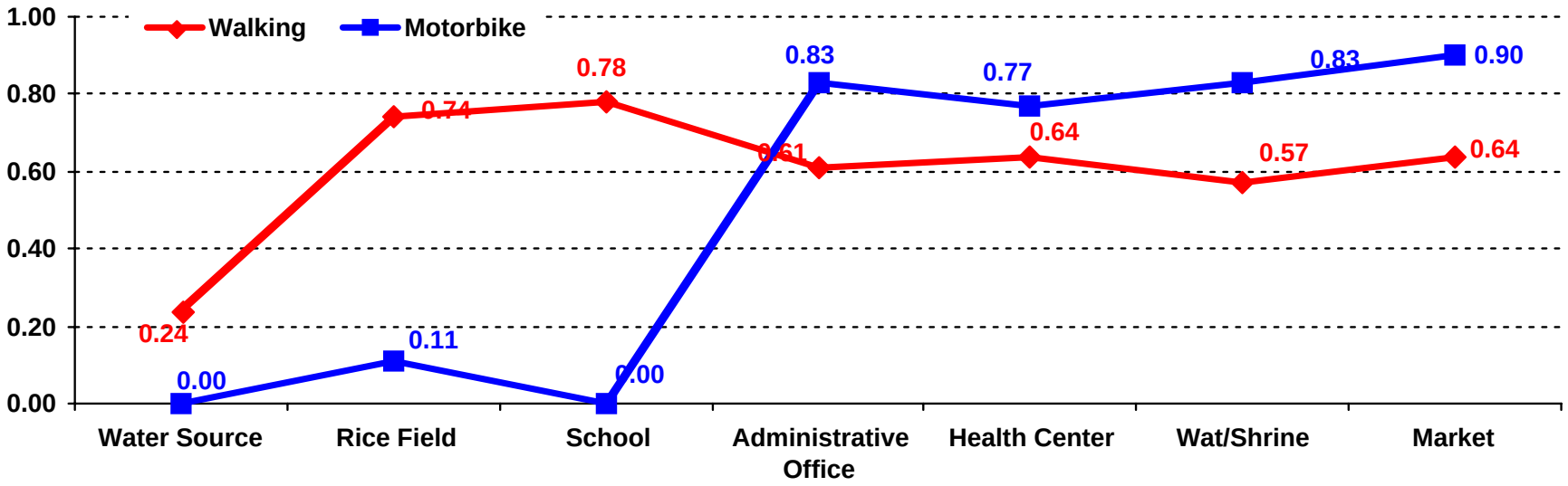


- Again, motorbikes are used only for longer trips (water and school are not significant).
- Respondents markedly overestimate travel times, independently from distance.

Question 3b

Mondulkiri - time From

Correlation FROM home To…
Respondents vs GPS



- **Mondulkiri's time correlation profiles of walking and motorbike are fairly similar to each other (when there are sufficient data). Actually, motorbike data offer a better correlation, even if they were regularly overestimated..**
- **Walking. There is a high correlation between respondents' and GPS walking times to all destinations.**
- **Motorbike. Very high or high correlation to all destinations available.**

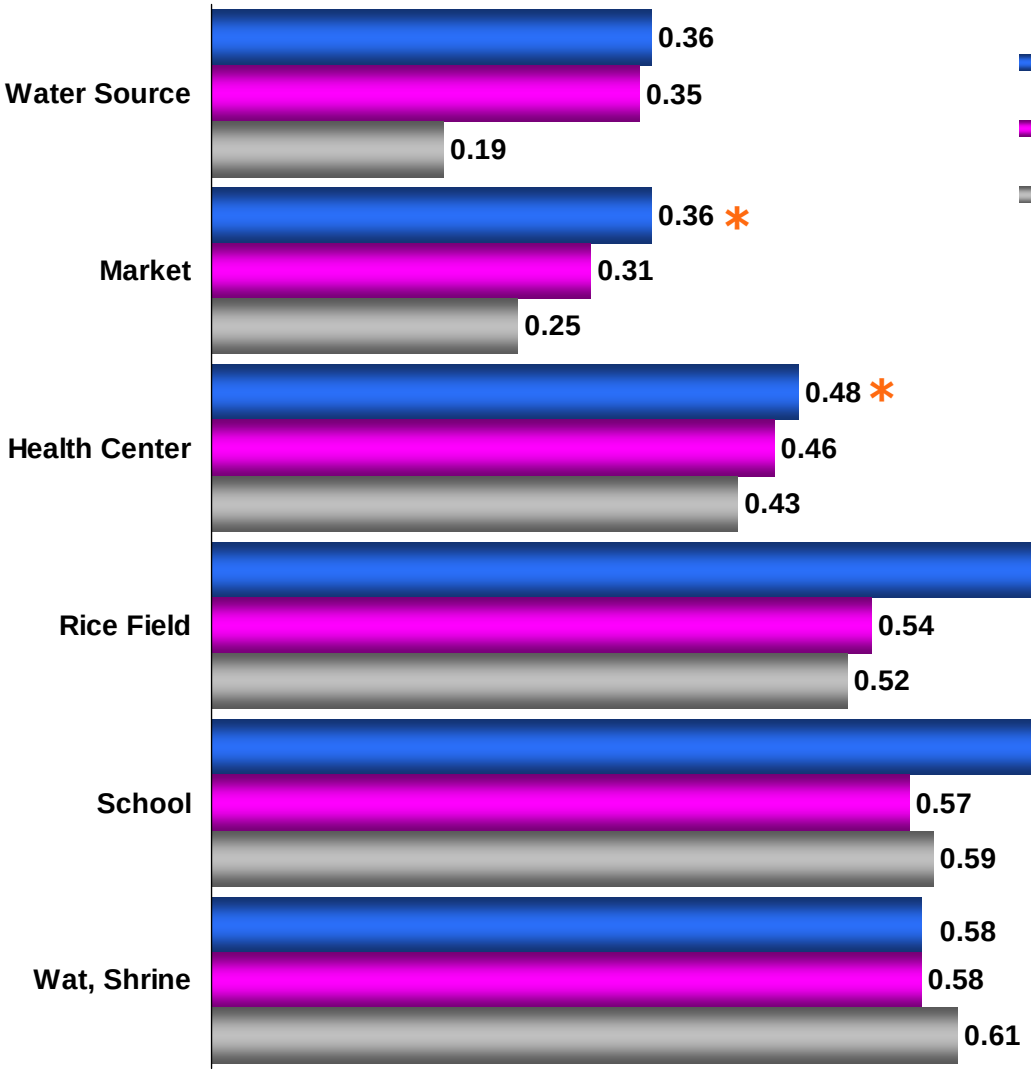
Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

INDOCHINA RESEARCH

Segmentation Analysis

Kg Cham - distances

Walking (60%) FROM home TO… GENDER vs GPS (kms)

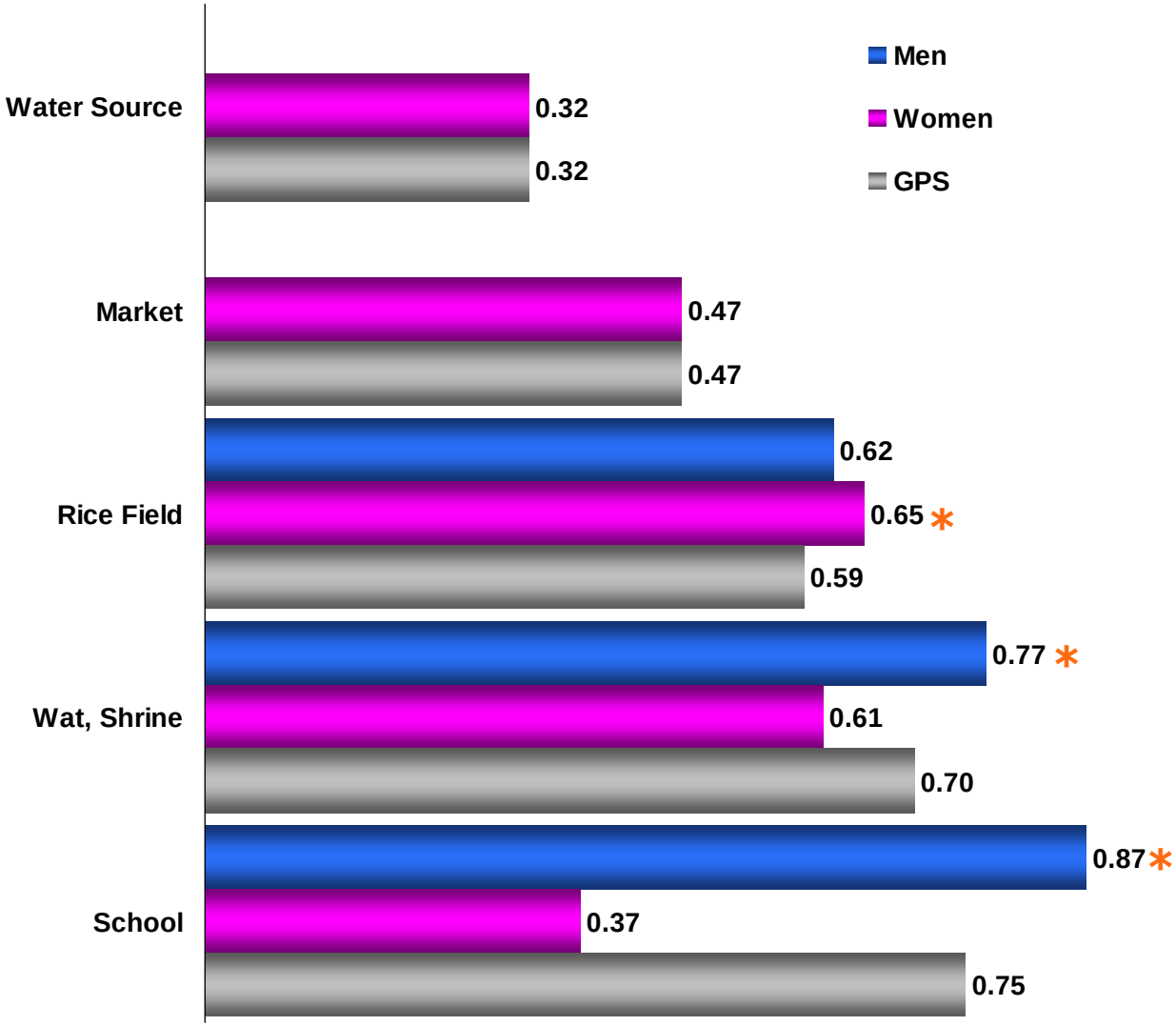


- *Only walking will be considered, because it presents a sufficient number of cases for all provinces and nearly all destinations.*
- *However, whereas for a variable such as gender there is a sufficient distribution of men and women for (nearly) all destinations, for age and especially education the samples' small size creates considerable significance gaps.*

- **Kg Cham - distances. In 4 cases, men's estimates are significantly greater than women's.**
- **Exceptions: water and wat.**

Kg Speu - distances

Walking (61%) FROM home TO…
GENDER vs GPS (kms)

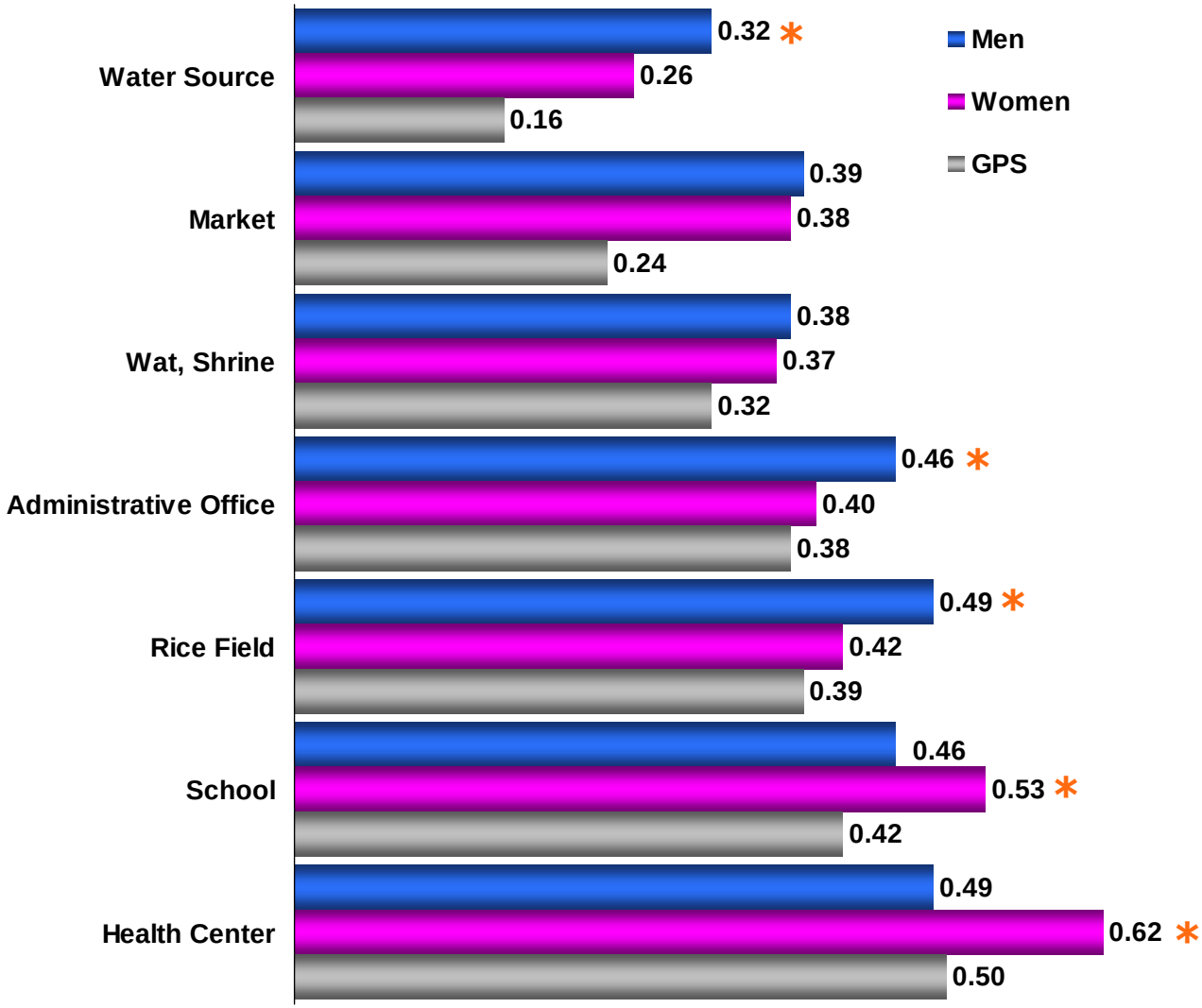


- In 2 cases (wat and school) men's distance estimates are significantly higher than women's.
- In one case (rice fields) women's estimates are (just) significantly higher.

Question 3a by S1

Mondulkiri - distances

Walking (90%) FROM home TO… GENDER vs GPS (kms)



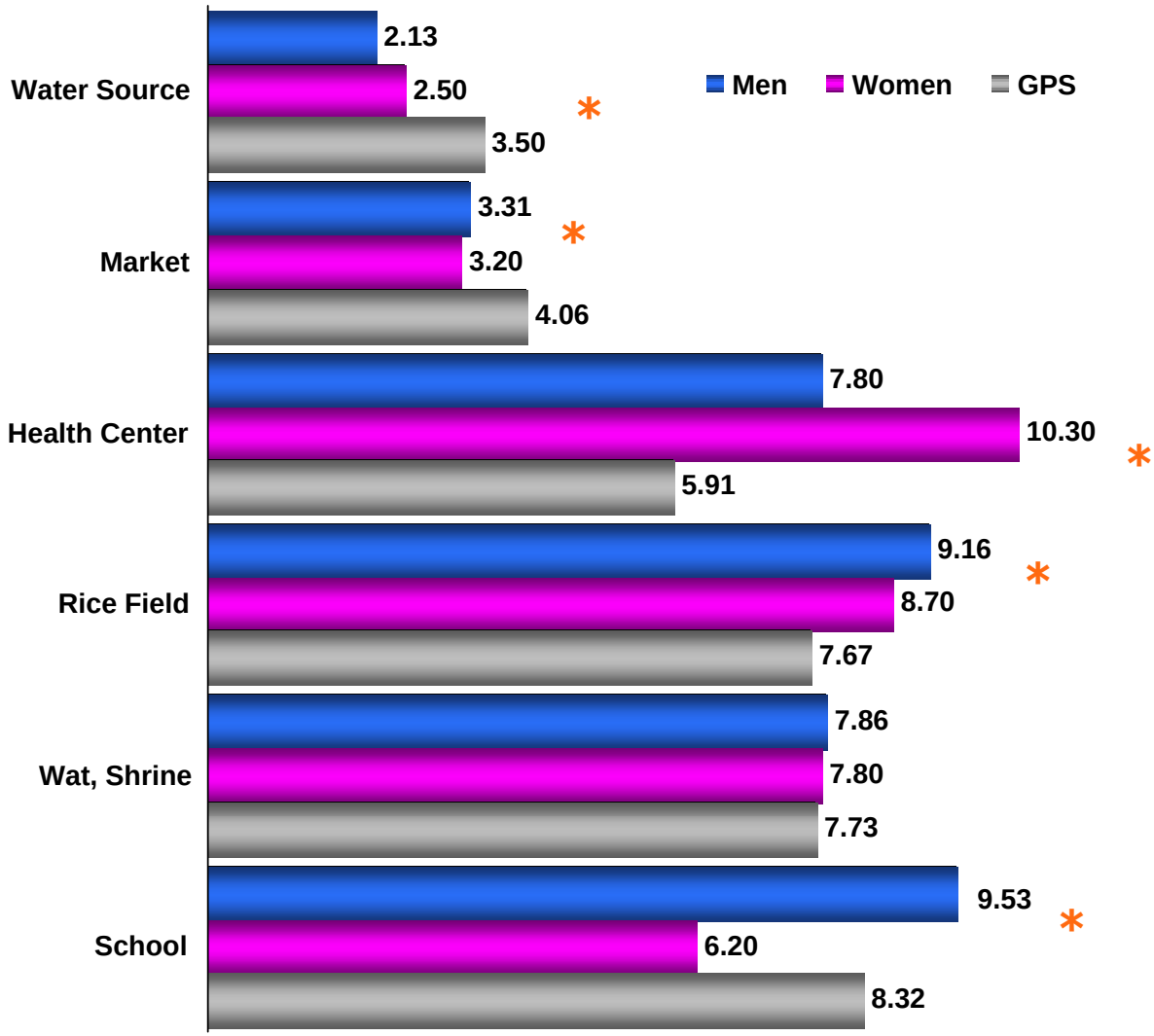
- In 3 cases (water, admin, rice) men are significantly higher.
- In 2 cases, women are.

- *On the basis of these limited data, one can advance the following hypotheses (which should be tested more extensively):*
- *Men tend to overestimate walking distances more than women.*
- *Destinations are irrelevant to gender differences.*

Question 3a by S1

Kg Cham - time From

Walking (60%) FROM home TO… GENDER vs GPS (mins)

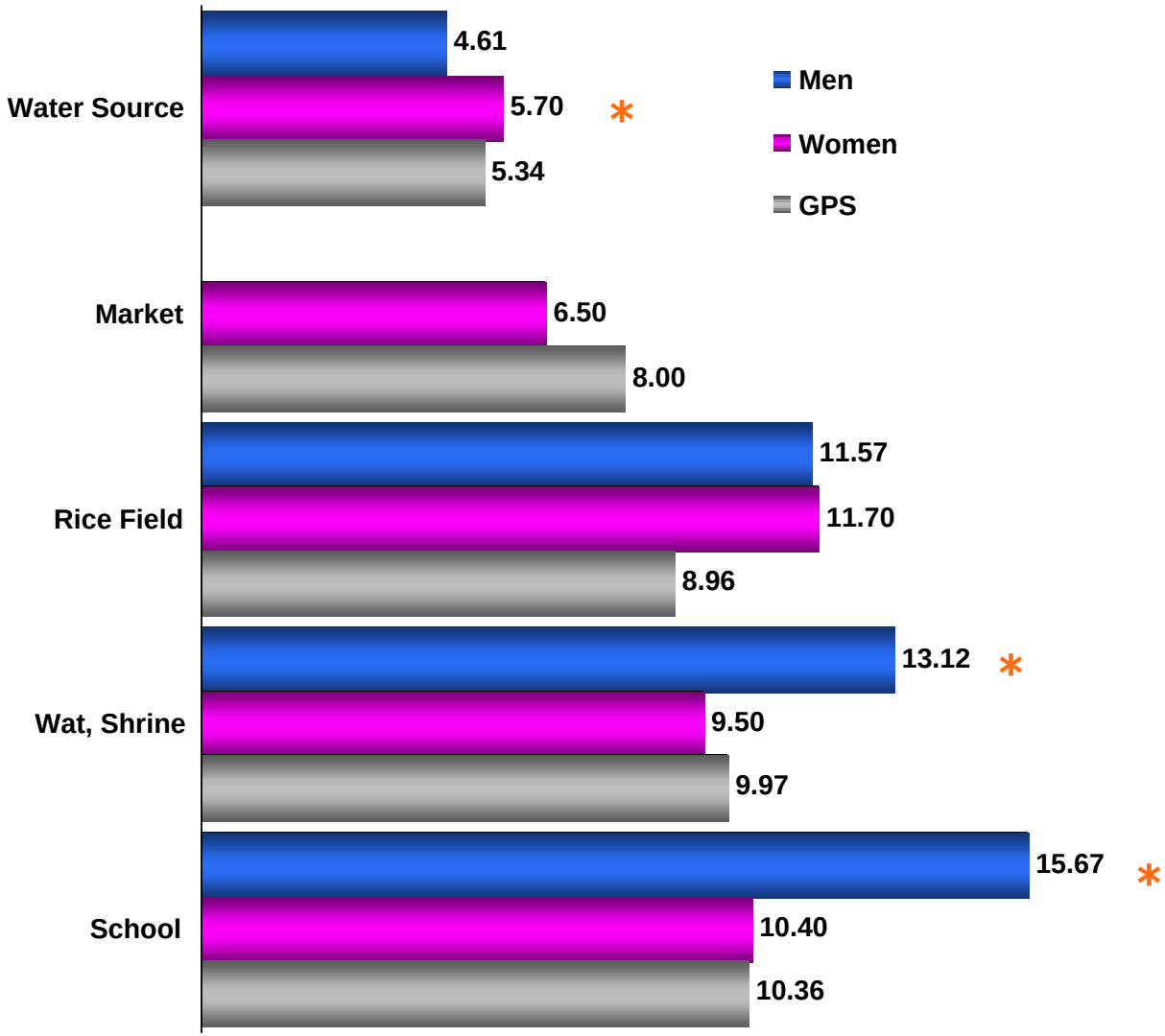


- In 3 cases (rice, school, market) men are significantly higher than women.
- In 2 other cases (water, HC) women are higher.

Question 3b by S1

Kg Speu - time From

Walking (61%) FROM home TO... GENDER vs GPS (mins)



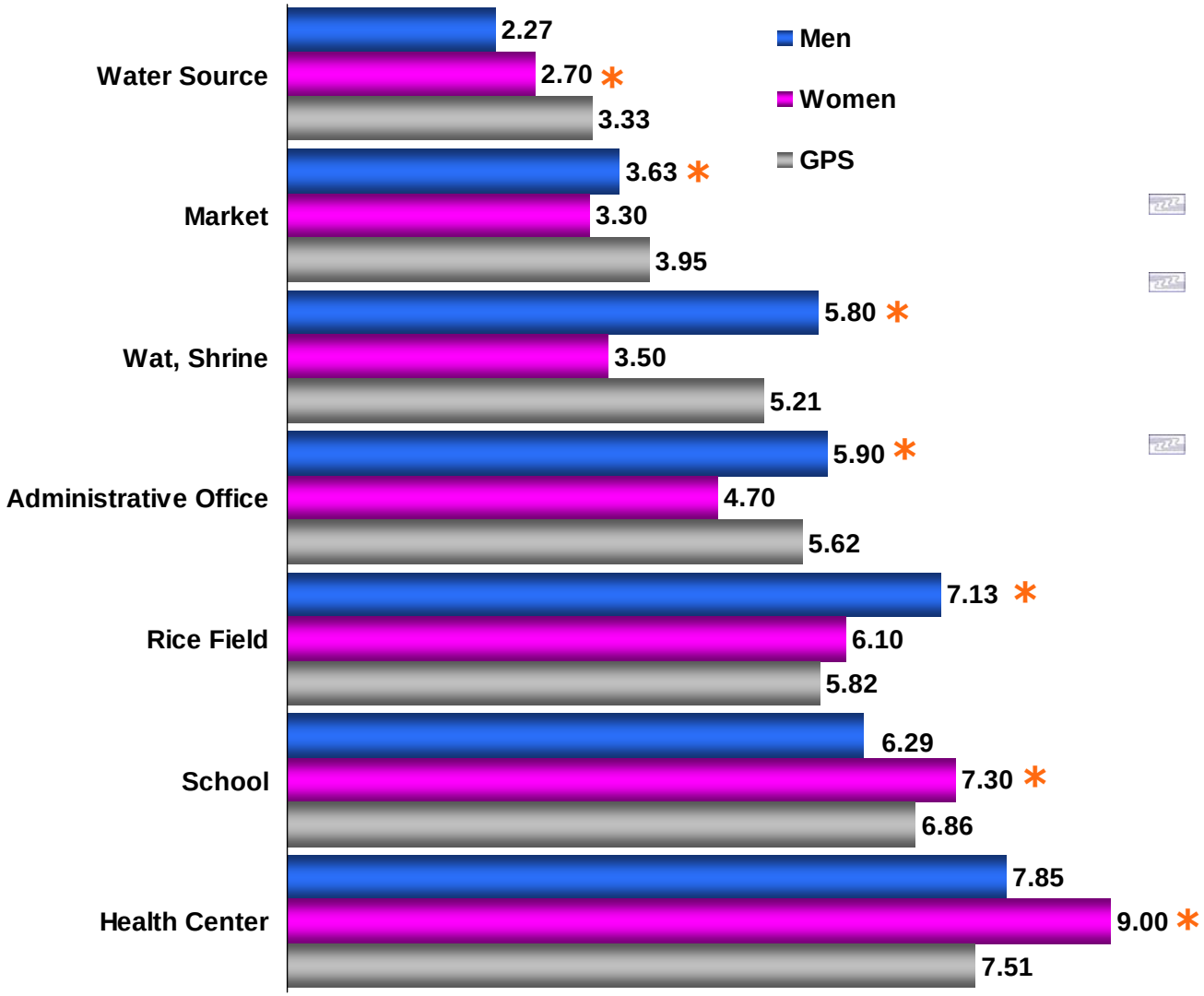
Men significantly higher: 2 cases (wat, school)

Women: 1 case (water)

Question 3b by S1

Mondulkiri - time From

Walking (90%) FROM home TO… GENDER vs GPS (mins)

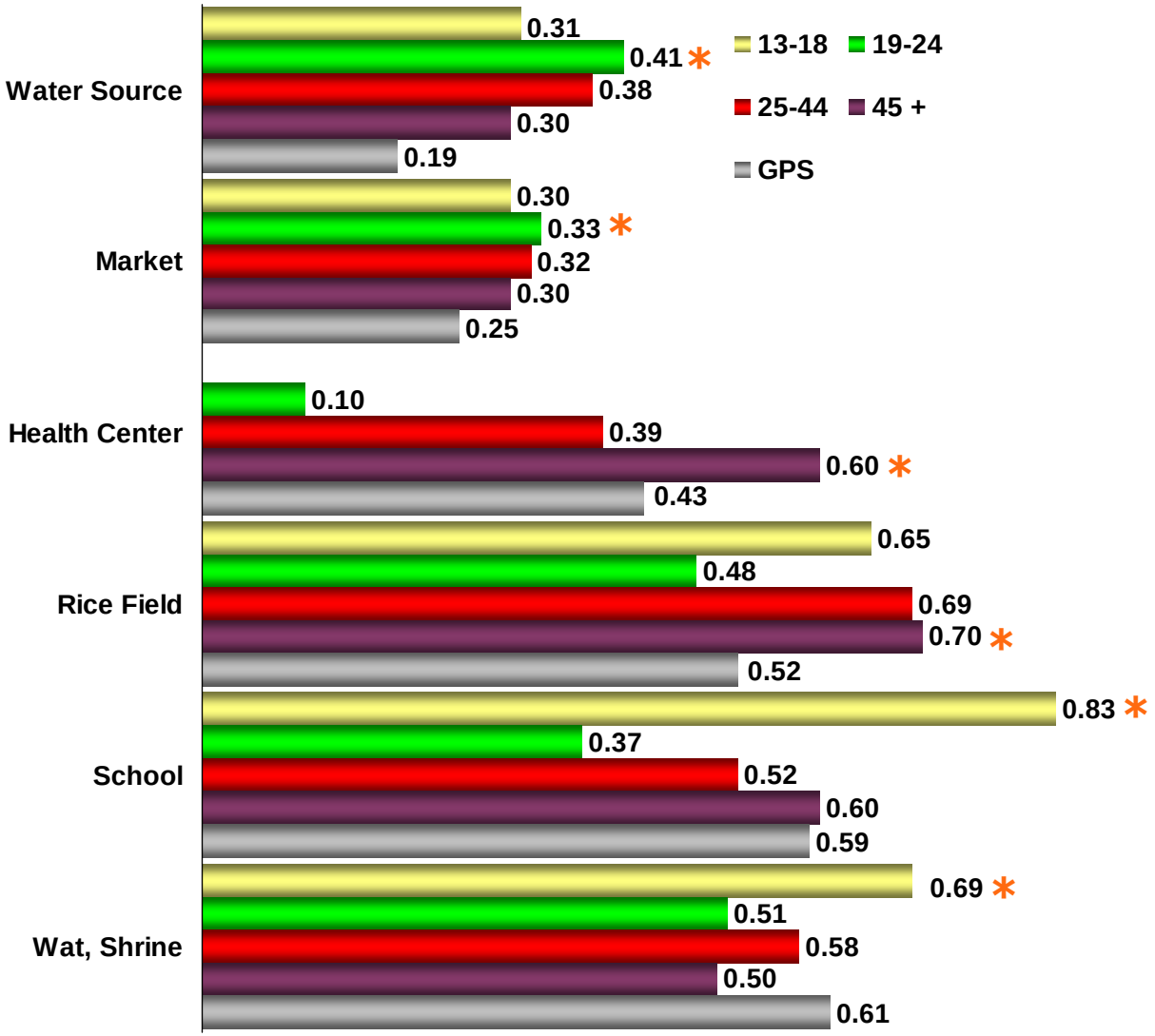


- Men are higher than women in 4 cases (market, wat, admin, rice).
- Women are significantly higher in the other three cases.

- ***There are no sufficient elements to assume that gender influences time evaluations (although men overestimate more than women)***

Kg Cham - distances

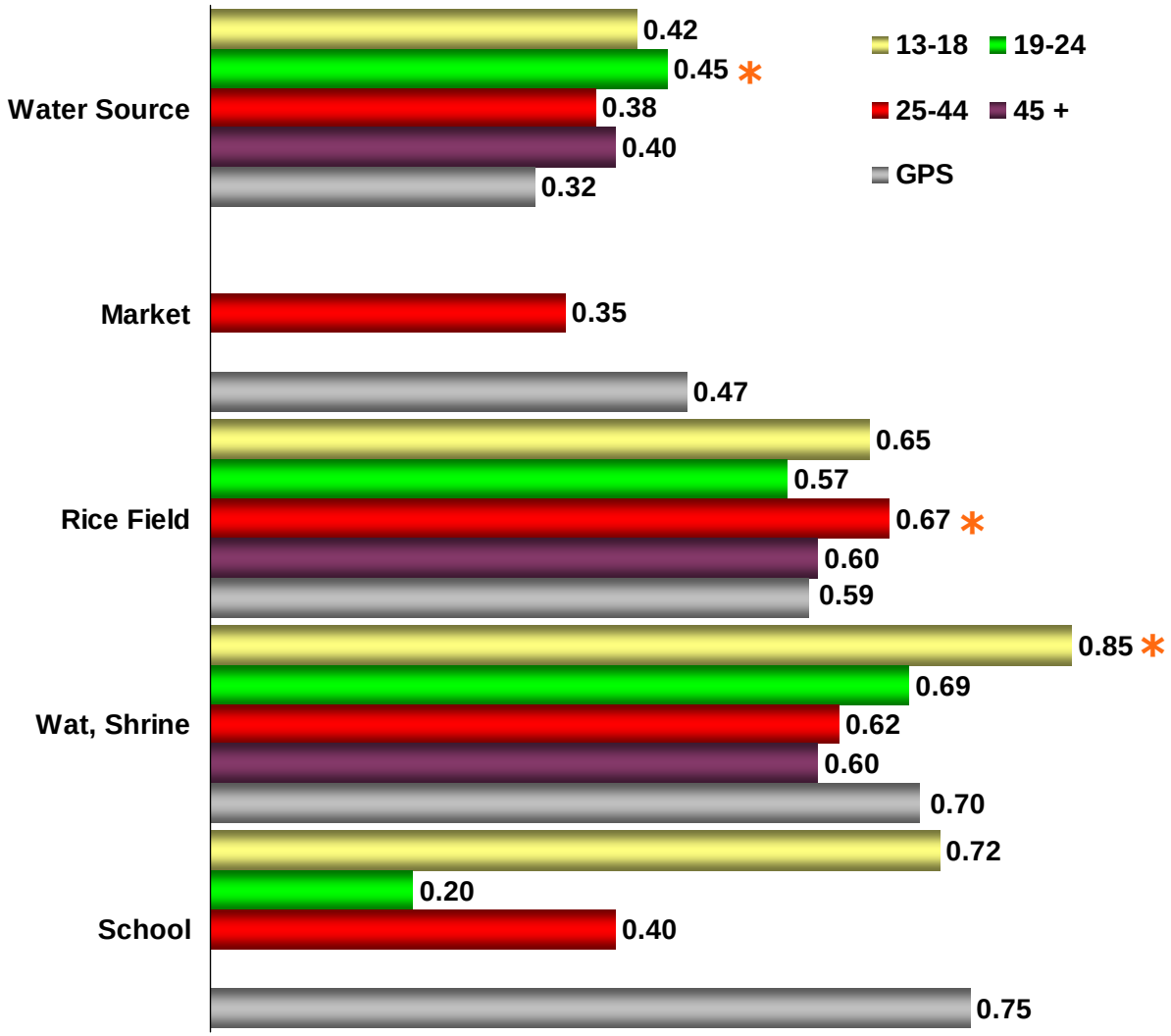
Walking (60%) FROM home TO...
AGE vs GPS (kms)



- Best approximation to GPS is by the oldest in 3 cases (water, market, school)
- By adults in 2 cases (HC, wat)
- By young in 1 case (rice)

Kg Speu - distances

Walking (61%) FROM home TO...
AGE vs GPS (kms)

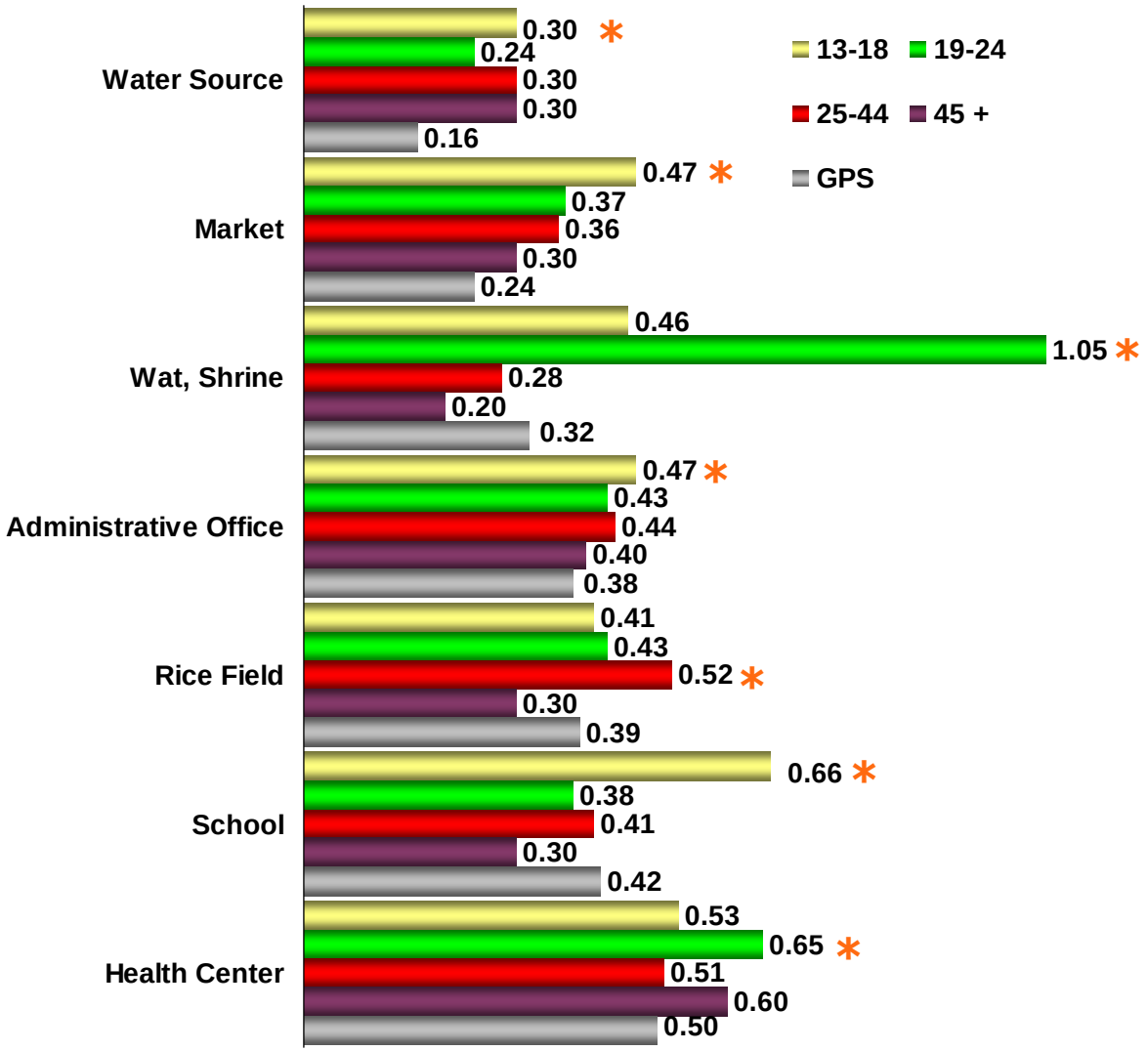


Best approximation: young 1, adults 1, oldest 1

Question 3a by S2

Mondulkiri - distances

Walking (90%) FROM home TO…
AGE vs GPS (kms)

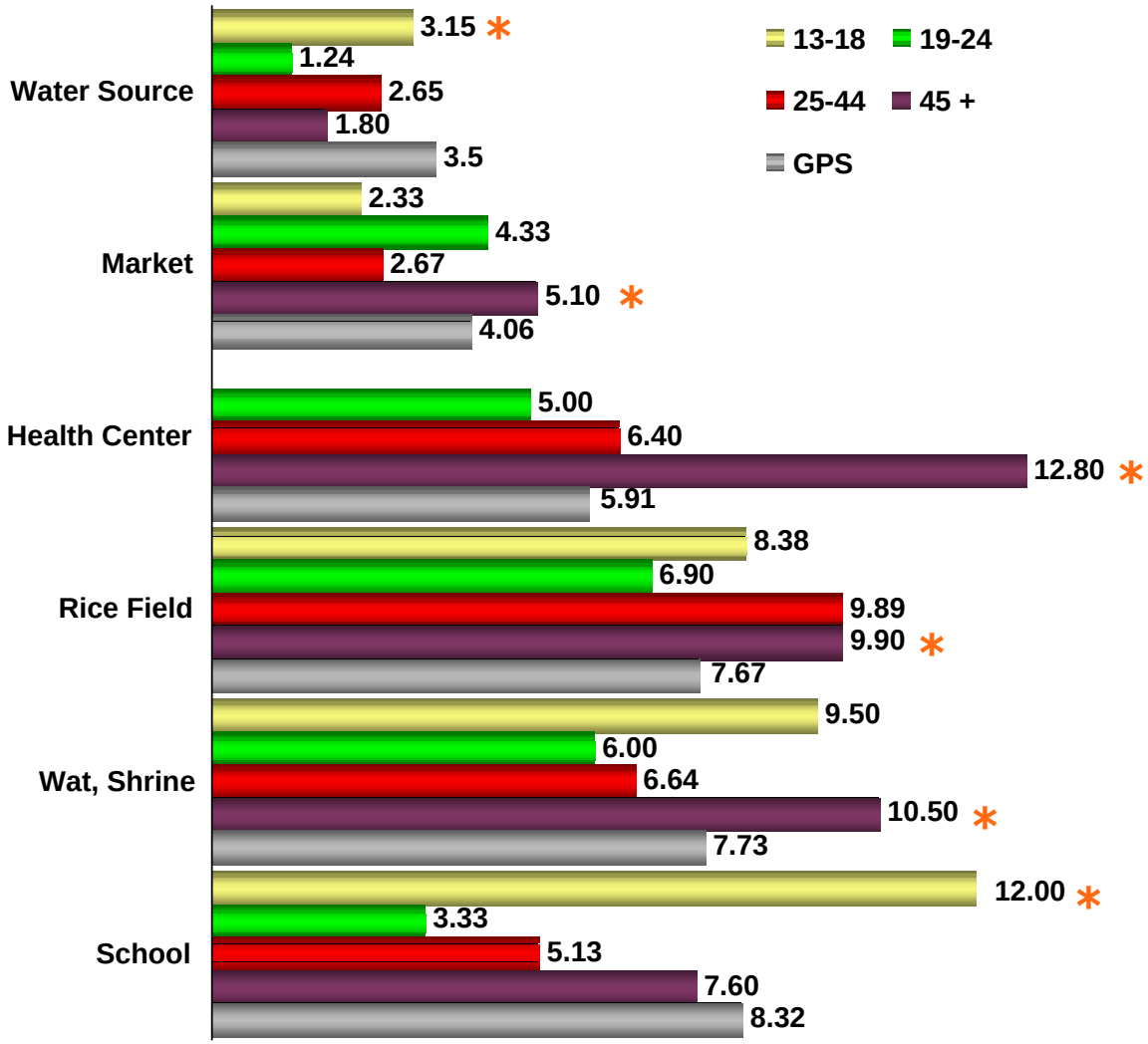


- **Best approximation: youngest 1, young 1, adult 3, oldest 2.**
- ***Hypothesis to test: distance estimates by people over 25 are more reliable than the younger people's.***

Question 3a by S2

Kg Cham - time From

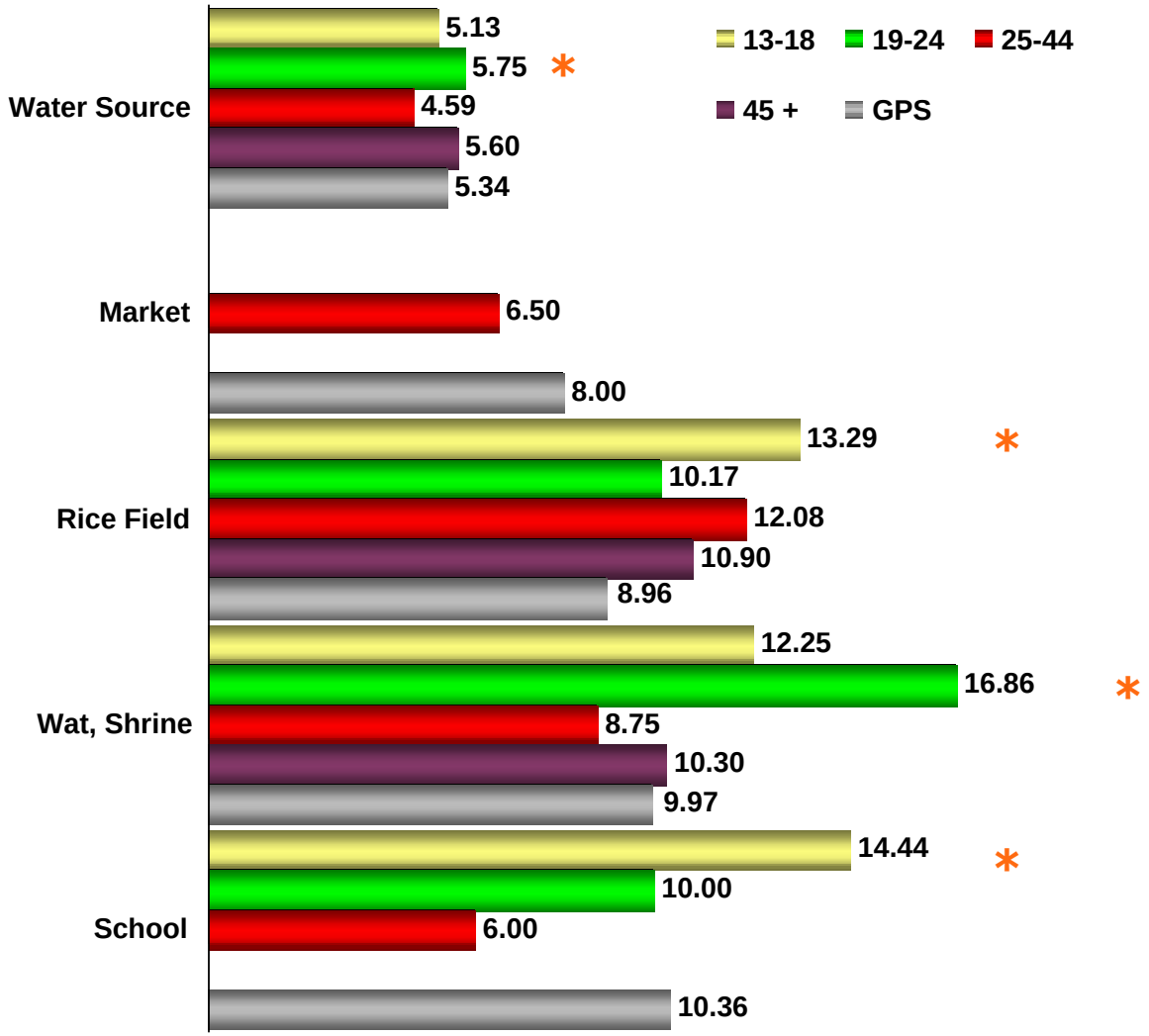
Walking (60%) FROM home TO...
AGE vs GPS (mins)



Best approximations: youngest 1, young 2, adults 2, oldest 1

Kg Speu - time From

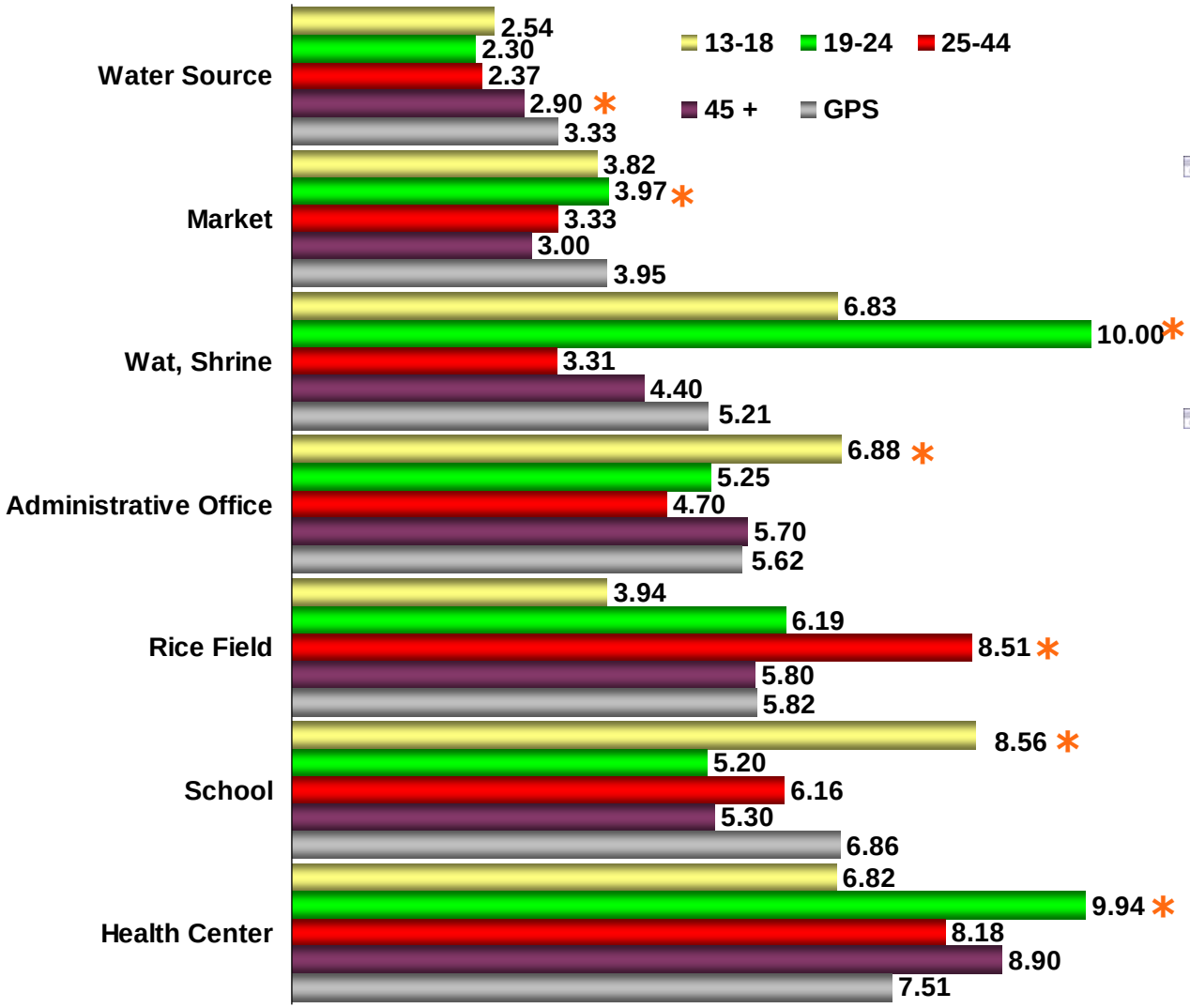
Walking (61%) FROM home TO...
AGE vs GPS (mins)



Best approximations: youngest 1, young 2, oldest 1

Mondulkiri - time From

Walking (90%) FROM home TO...
AGE vs GPS (mins)

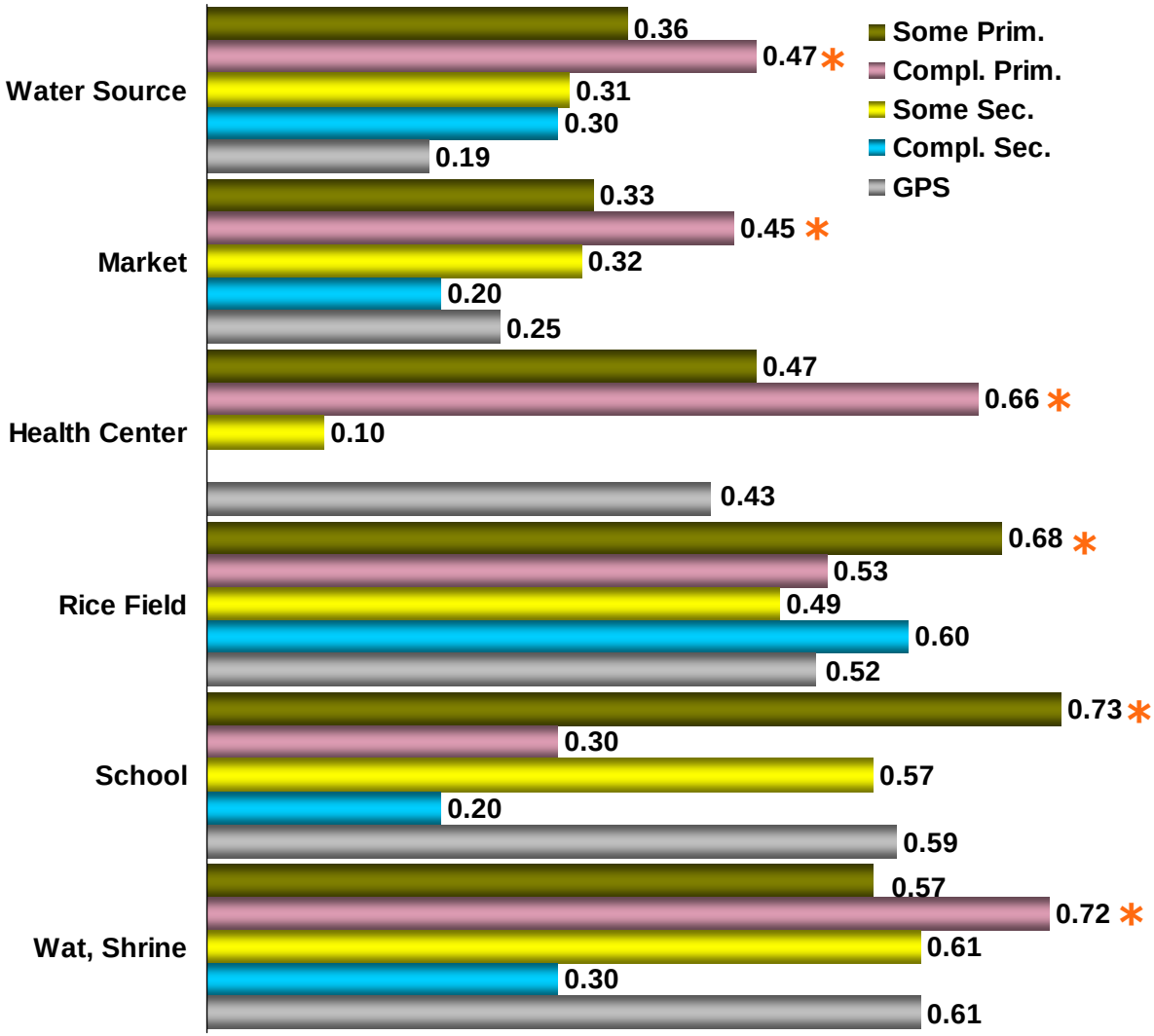


Best approximations: young 1, adult 2, oldest 4.

There are no sufficient elements to assume that age influences time estimates (although the two older age groups seem slightly more reliable).

Kg Cham - distances

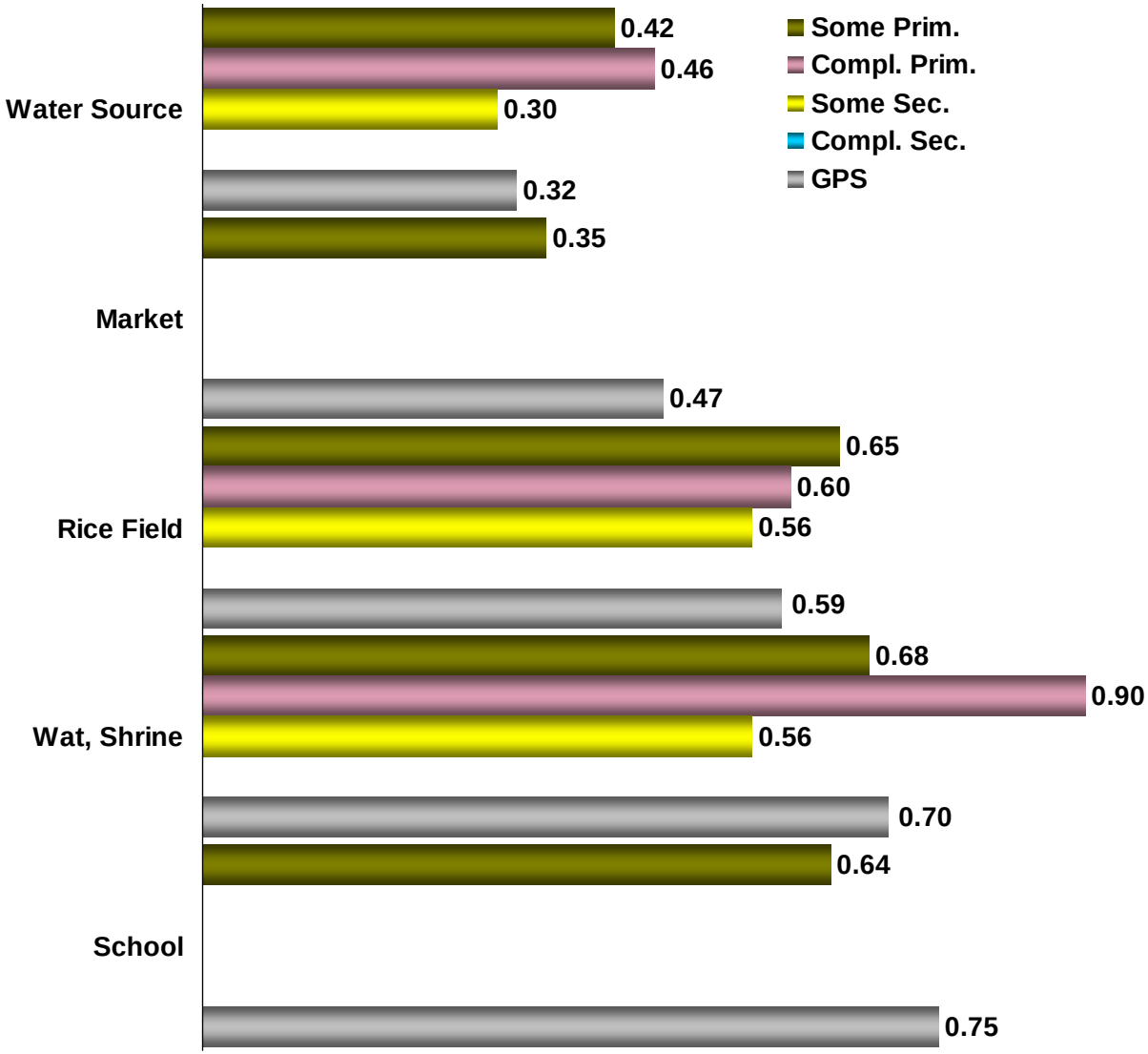
Walking (60%) FROM home TO… EDUCATION vs GPS (kms)



Best approximations (ignoring completed secondary school - only 2% of the sample): primary 1, some secondary 4.

Kg Speu - distances

Walking (61%) FROM home TO... EDUCATION vs GPS (kms)

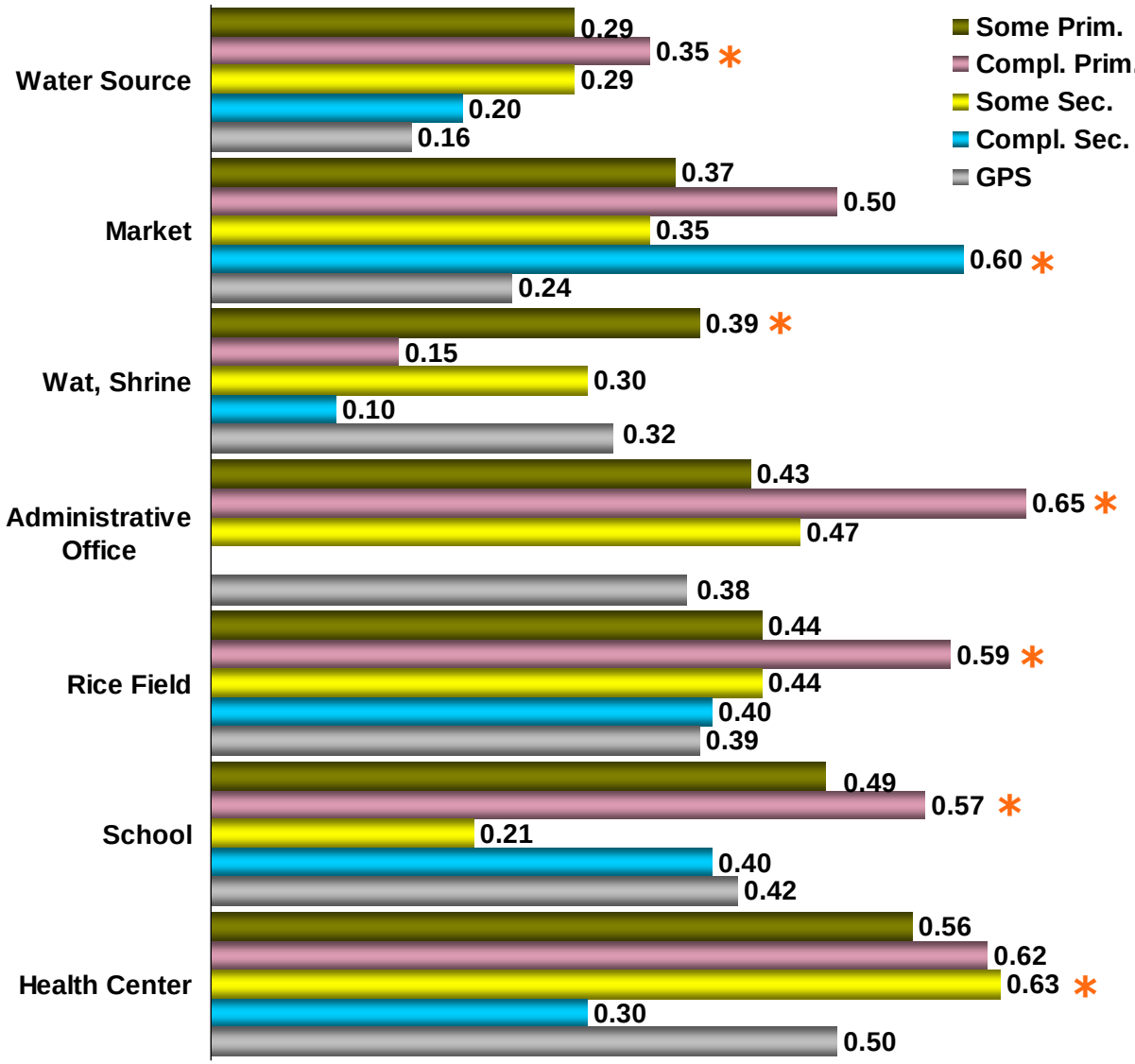


Best approximations: some primary 1, primary 1, some secondary 1.

Question 3a by S3

Mondulkiri - distances

Walking (90%) FROM home TO… EDUCATION vs GPS (kms)

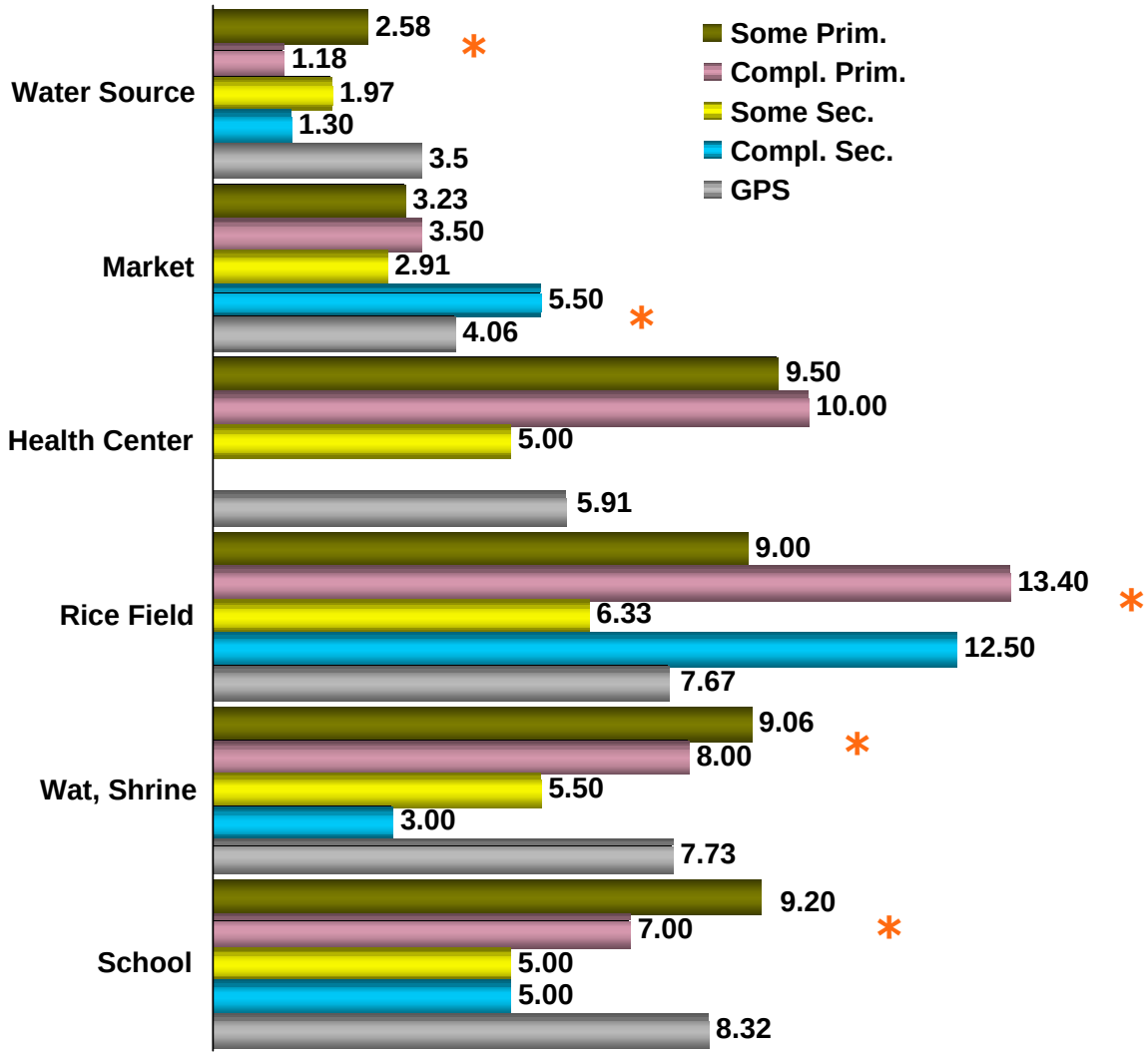


- **Best approximations: some primary 4, some secondary 4.**
- ***There are some indications that higher education levels correlate to better approximations of distances.***

Question 3a by S3

Kg Cham - time From

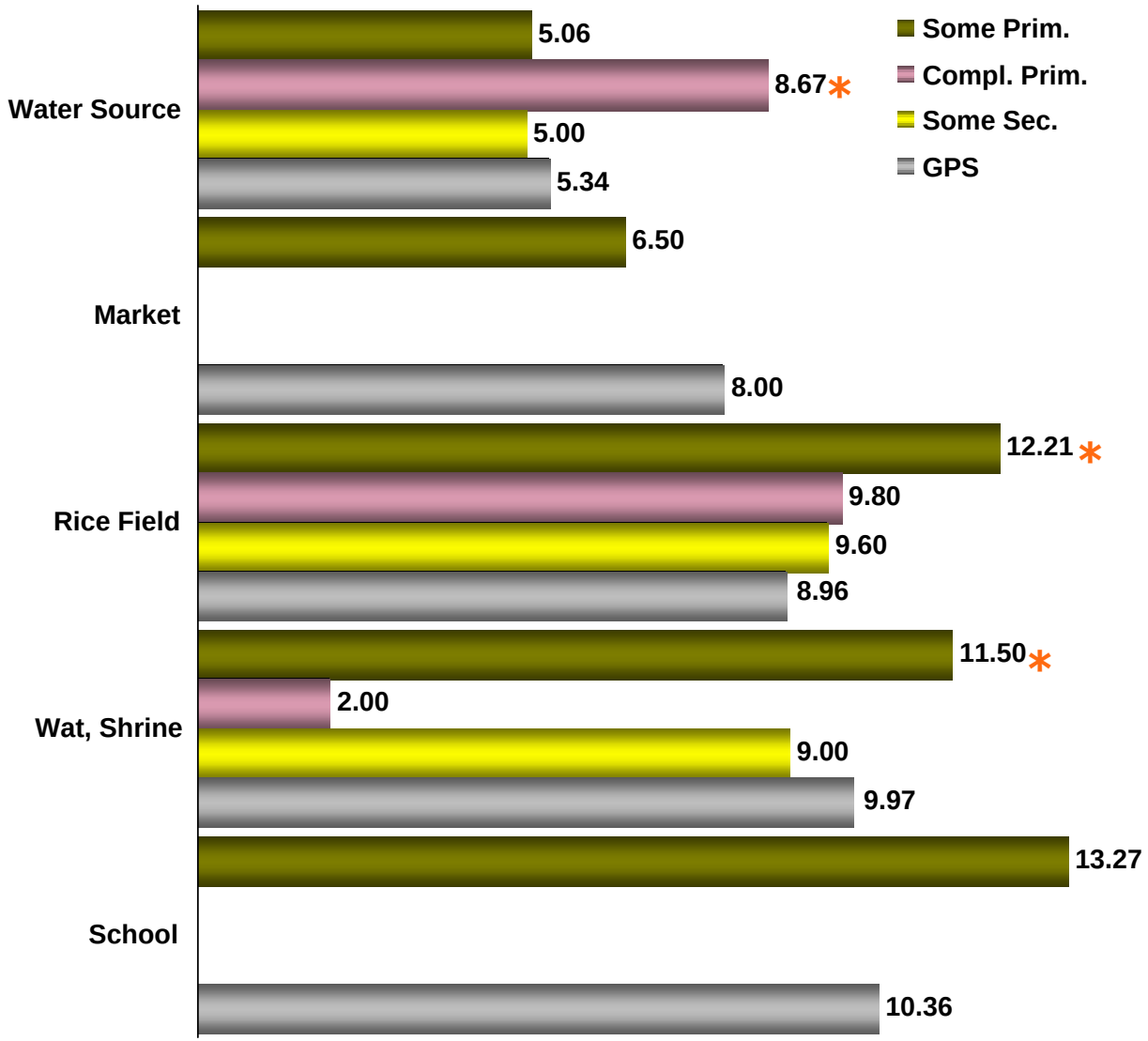
Walking (60%) FROM home TO... EDUCATION vs GPS (mins)



Best approximations: less educated 3, primary 2, some secondary 1

Kg Speu - time From

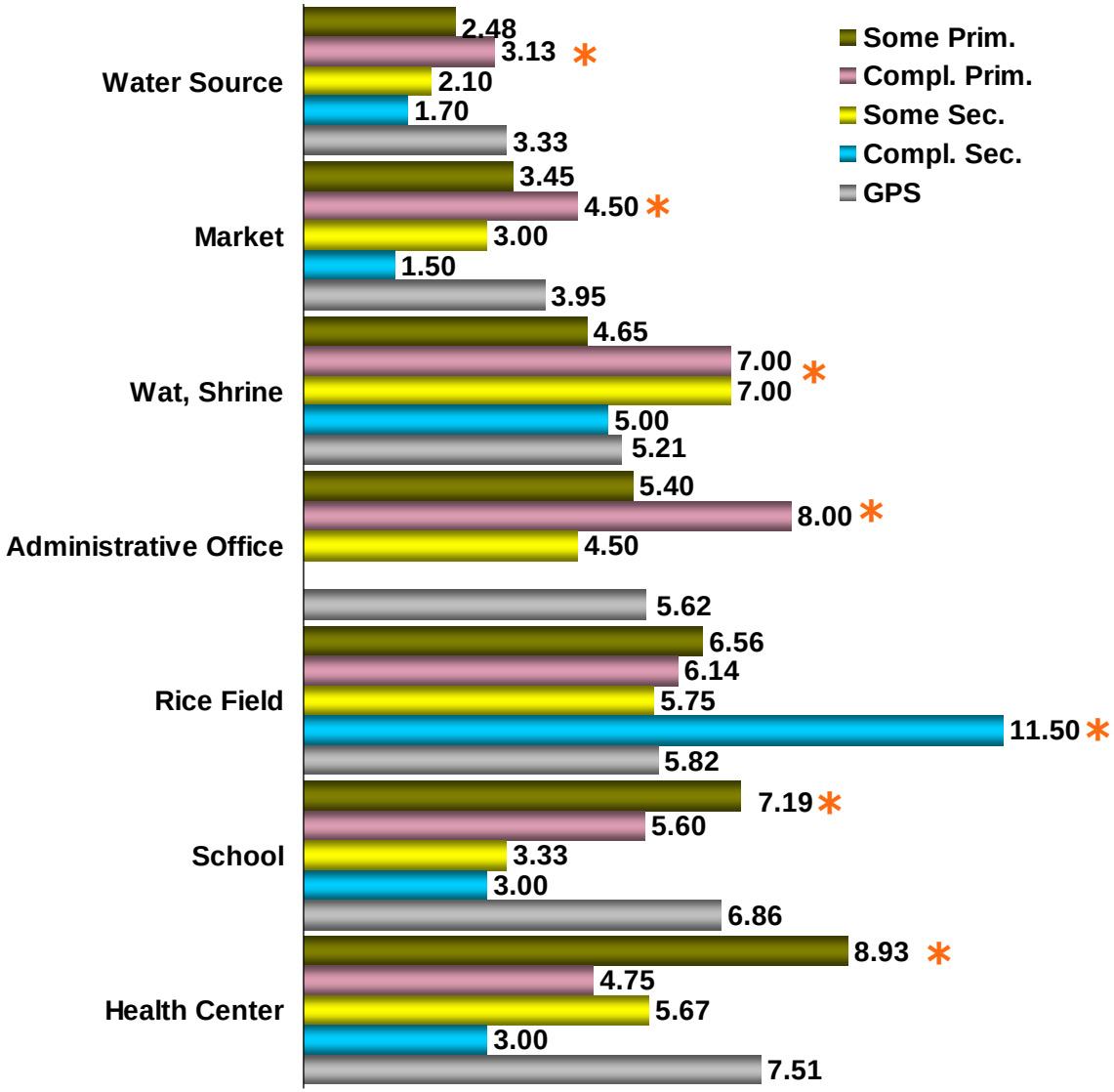
Walking (61%) FROM home TO... EDUCATION vs GPS (mins)



Best approximations: less educated 1, some secondary 2

Mondulkiri - time From

Walking (91%) FROM home TO… EDUCATION vs GPS (mins)



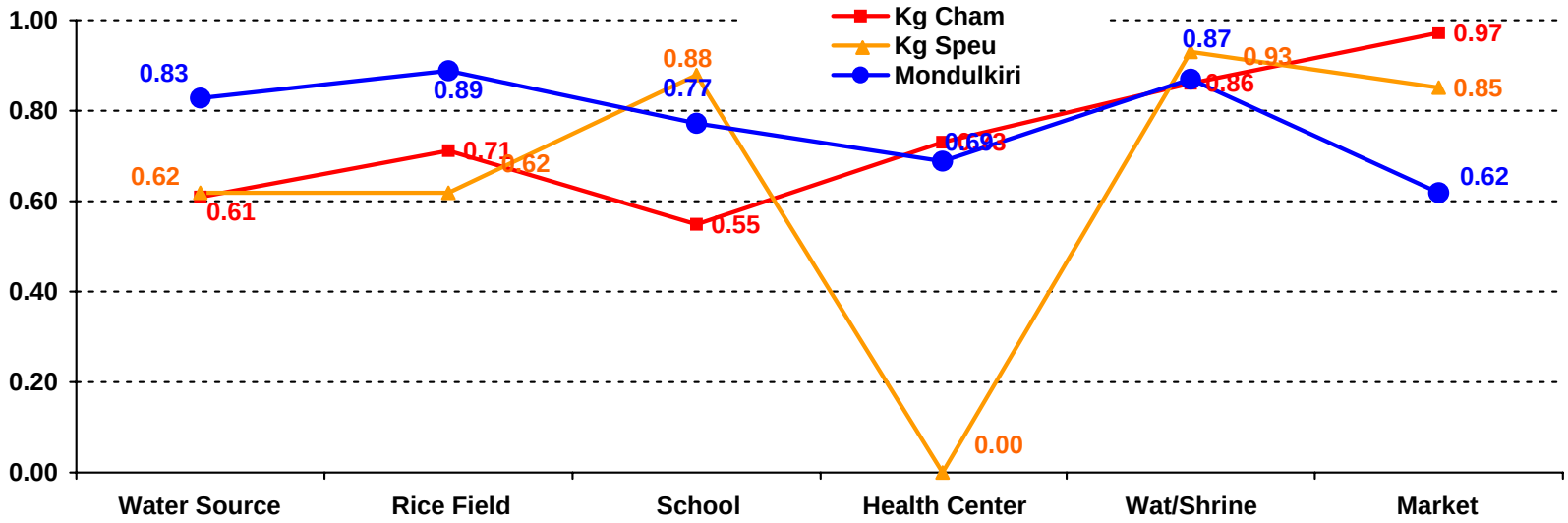
- **Best approximations: some primary 5, primary 1, some secondary 1.**
- ***There seems to be no correlation between times' estimations and educational levels.***

INDOCHINA RESEARCH

Comparisons and Conclusions

3 provinces - DISTANCES

WALKING
Respondents vs GPS

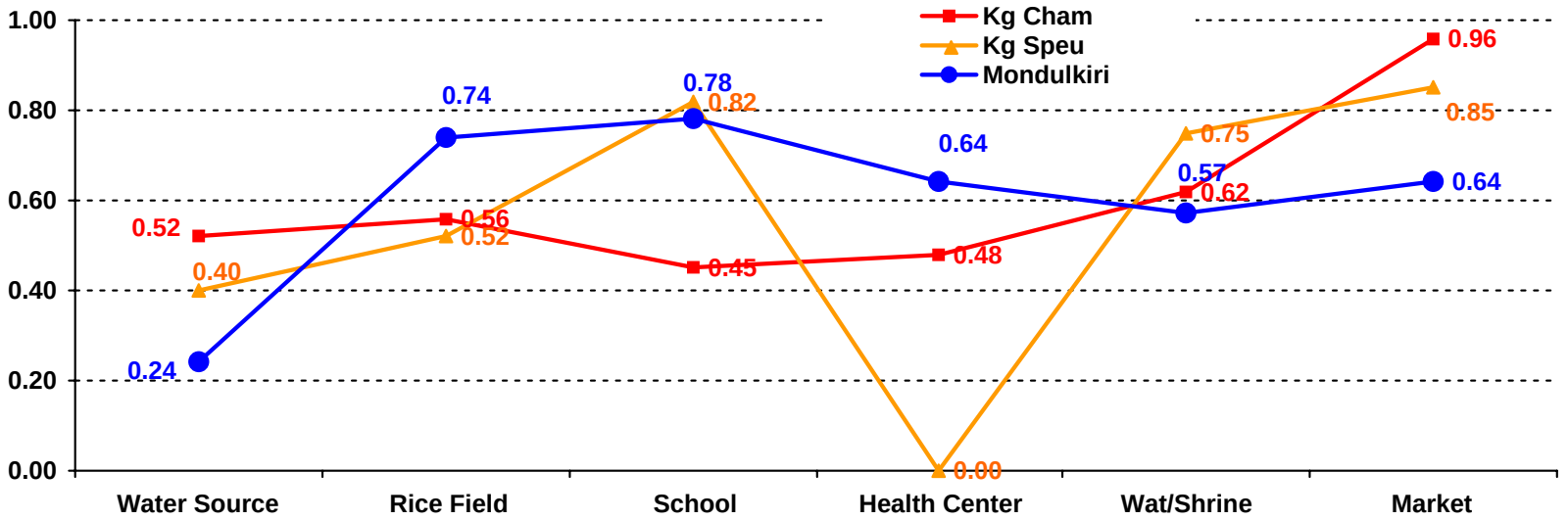


- **The three provinces' profiles are fairly similar. In general there is a high or very high correlation between perceived walking distances and actual ones - i.e. they vary proportionally together.**
- **Thus, estimated distances are good indicators (in absolute terms, errors on walking distances rarely amount at more than 100 metres - but in all 3 provinces distances are quite short).**
- **Destinations don't seem to make much difference to correlation levels. The best correlations are for wats.**
- **(Administrative offices are omitted because only in Mondulkiri there is a sufficient number of respondents who go there. Nobody walks to health centres in Kg Speu.)**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

3 provinces - TIMES

WALKING
Respondents vs GPS

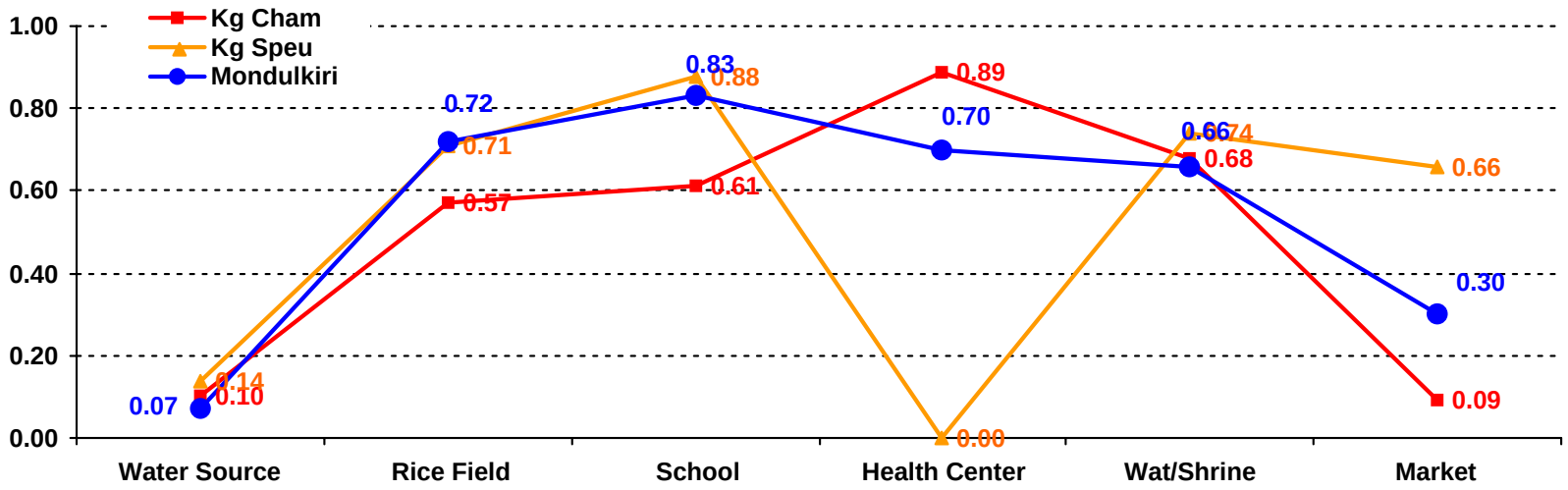


- **In the case of perceived walking time vs GPS time, the three correlations profiles show weaker correlations than the distance ones: most are moderate to high.**
- **Provinces are in general quite close, with Mondulkiri having marginally the best profile, perhaps because they have on the whole the shortest distances (3 to 7 minutes).**
- **Quantitatively, respondents tended to overestimate walking times. The biggest percentage error margins were for the closest destinations (especially water, which also has the lowest correlation).**
- **One must remember GPS time is obtained by timing one steady walk, whereas respondents' time also accounts for encounters, chats etc…**
- **Perceived walking times show on the whole an acceptable level of correlation with actual times; they seem to be less reliable for short distances.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

3 provinces: DISTANCE & TIME - 1

WALKING
Respondents' distance vs respondents' time

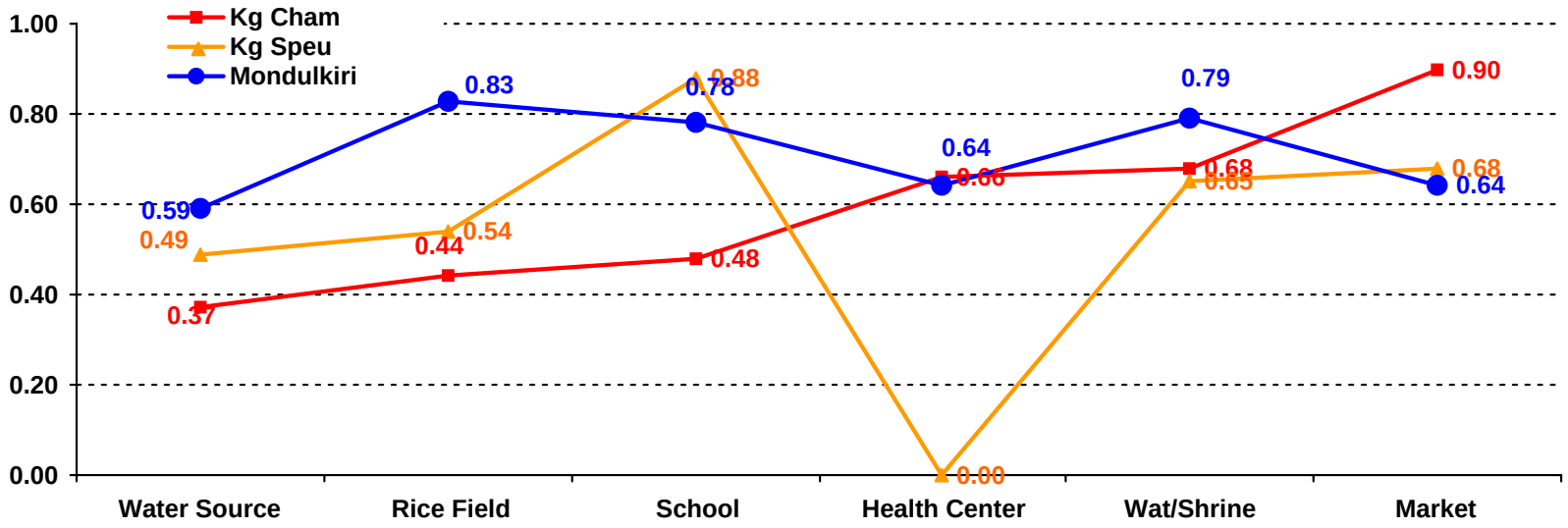


- With the exception of water and markets, where the correlation level is low or at most moderate, the other perceived distance/ perceived time correlations are high or very high in all three provinces.
- Times and distances to wats, schools and ricefields are the best correlated in all three provinces: this is probably because they are routine destinations, but not as close as water.
- Most correlations are above .6; thus one can say that perceived walking distances vary with a good relation to perceived walking times.

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

3 provinces: DISTANCE & TIME - 2

WALKING
GPS distance vs respondents' time

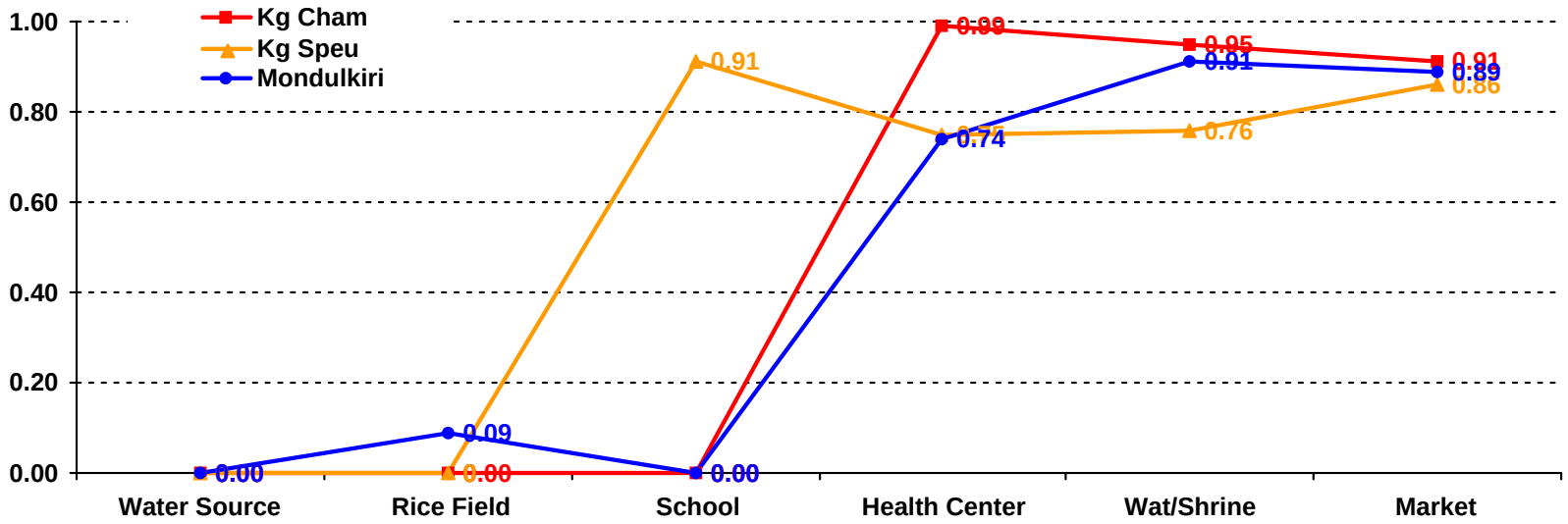


- **In the case of correlation between GPS actual distance and respondents' time, the three provinces' profiles are again close.**
- **With GPS, respondents' subjectivity has been filtered out of distance, and the level of time/distance correlation increases for all destinations.**
- **Wats and markets, and to a lesser extent schools, show high correlation levels, for the reasons discussed previously. Water sources keep showing low or no correlation, again for the same reasons as before.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

3 provinces - DISTANCES

MOTORBIKE
Respondents vs GPS

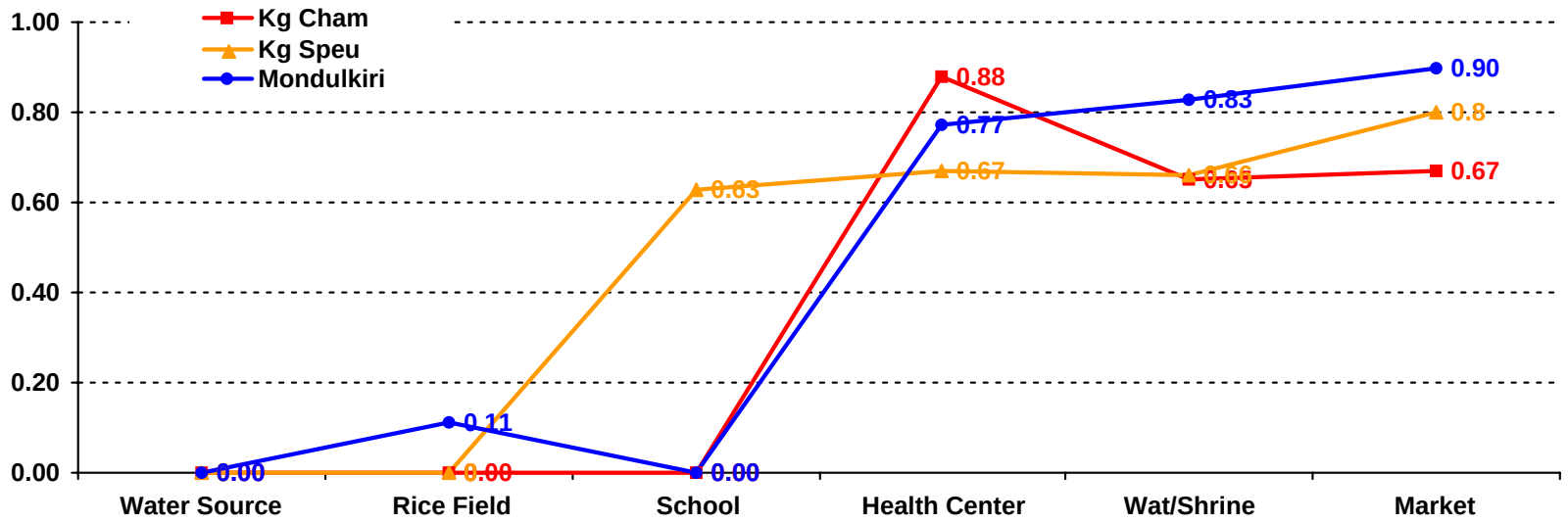


- There is a very high, or nearly very high, correlation between all motorbike perceived distances and the actual motorbike distances.
- The profile for all three provinces is very similar, and coincident in the case of markets - possibly the most common destination of motorbike trips.
- On the whole, motorbike distance estimates seem to vary in close relation with the actual distance variations; they are better correlated than walking distance estimates, in all three provinces.
- Of course, motorbike estimates cannot be used for close destinations.

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

3 provinces - TIMES

MOTORBIKE
Respondents vs GPS



- **The correlation between perceived motorbike times and actual motorbike times is high, but not as high as for distances.**
- **Quantitatively, respondents' figures tended to overestimate times; however, the table shows that overestimates vary in proportion with actual times.**
- **There are no significant differences between provinces.**

Correlation Size	Strength of Relationship
0.8 to 1.0	Very high +ve correlation
0.6 to 0.8	High +ve correlation
0.4 to 0.6	Moderate +ve correlation
0.2 to 0.4	Low +ve correlation
0.2 to -0.2	No real correlation
-0.2 to -0.4	Low -ve correlation
-0.4 to -0.6	Moderate -ve correlation
-0.6 to -0.8	High -ve correlation
-0.8 to -1.0	Very High -ve correlation

Summary Comments Response to Key Questions (1)

INDOCHINA RESEARCH

How reliable are reported distances as proxies of actual distances?

- **Perceived walking distances are generally a more reliable indicator than perceived walking time. They don't show consistent over/under estimates, and have a high correlation with GPS distances.**
- **Perceived motorbike distances are more reliable than perceived walking distances, with a very high correlation with actual distances.**
- **In percentage terms, errors in perceived walking distances are highest on the shortest trips (e.g. water) - even if in absolute terms they're small.**

How reliable are reported times as proxies of actual times?

- **Perceived walking times tend to be overestimated by respondents**
- **Perceived motorbike travel time is overestimated, but to lesser extent than walking.**
- **Both for walking and motorbike, perceived times' correlation with GPS times is good, but not as good as its distances equivalent.**
- **Travel time "from home to destination" is more reliable (closer to actual GPS verification times) than travel time stated "from destination to home".**
- **The state of roads, and the size of the road network, improve distance estimates. They improve time estimates as well, but not to the same extent.**

Summary Comments Response to Key Questions (2)

How can travel times be explained by travel distances?

- **Respondents Perceived Walking time…**
  - **Perceived walking times are well correlated with perceived walking distances – except for the closest (water) and farthest (market) destinations .**
  - **Perceived walking times are well correlated with actual GPS distance measurements, with moderate correlation levels for both water and market.**
  - **On the whole, perceived times can be a good predictor of distances - but possibly not in all cases. A wider range of cases should be examined.**

- **Perceived Motorbike Travel Times**
  - **Perceived motorbike times and motorbike distances are highly correlated, though not as highly as motorbike distances.**
  - **Motorbike times are more reliable, albeit slight overestimated, predictors of travel times.**
  - **Motorbike distances explain motorbike times better than in the case of walking**
  - **Motorbike times can be used only for middle- and long-distance destinations.**

Summary Comments Response to Key Questions (3)

INDOCHINA RESEARCH

What is the impact of personal characteristics on reported and actual travel times?

- In the majority of cases, destinations are distributed by ascending distance thus: water, rice, admin. office, school, health centre, wat, market.
- Distance estimates for Rice & Admin are similar, as are School and Health Centre. However, their actual distance does not seem correlated to accuracy of estimates.
- Among all destinations, wats have the best time & distance correlations of respondent estimates and GPS verification both for distance and time; correlations for water sources were the lowest.
- This finding may be subject to some constant "external influences" – such as the ritual of going to the wat leads to a more acute consciousness of time and distance, going to water source means coming back carrying it (and thus is perceived as longer), etc.
- The data show that in most cases men tend to overestimate distance more than women; this is independent from destination.
- People over 25 tend to give better estimates of distances (and possibly of times). Education levels may be correlated to distances.
- However, the above hypotheses about gender, age and education need to be tested more extensively and with more specific research tools.

Summary Comments Response to Key Questions (4)

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Which measure, time or distance, is recommended as probably more reliable and relevant under particular circumstances – and why?

- **Distance should be preferred - they are better correlated with actual GPS data. Times however show themselves fairly reliable too.**
- **People seem more familiar with measures of distance than measures of time.**
- **Moreover, perceived time to any destination is subject to many factors (e.g. encounters, chats, weights carried etc), which cannot be adequately measured.**

How should time and/or distance questions be best phrased in each survey country?

- **Distances – measures of distance should be asked using a person's units, translating them in kms if needed. The best indicator of actual distance is the distance associated with their most common mode of transport.**
- **Time - should be asked in general terms, possibly using natural indicators (sun, etc). Asking time from destination to home is superfluous.**
- **Locations - Seven destinations are too many, and too subjects to local vagaries: it would be better to identify in each village, from a fixed list of destinations, the closest, the farthest and the middle one, measure their distances & times, then limit the interview to those three. That would also allow more cogent comparisons.**
- **Interviewees should be screened in order to gauge their familiarity with time/distance measurements. Two questionnaires should be used - the standard one, and a very simplified version.**

Summary Comments

Recommendations

- **Re-examining the study, one comes to very similar conclusions to those of an identical study in Laos:**
  - **The sample size per province, and the number of provinces chosen, were too small.**
  - **Combined with the quantity of segmentations offered (mode of transport and destination, optionally frequency of trips, etc), this created too many subsegments that, given the sample size, could hardly have been significant.**
- **Thus, recommendations for future Time & Distance studies would be:**
  - **Sample - A larger sample size per province, so to guarantee that the theoretical sub-samples are large enough to allow for meaningful analysis**
  - **Locations - Instead of 3 diversified provinces, it would be better to choose pairs of provinces with similar socio-economic and infrastructural characteristics, and conduct comparative studies. That would also allow a more homogeneous sample, yielding statistically sounder results.**
  - **Questionnaire - should be simplified along the lines described previously and a section could be introduced, probing the interviewees' perceptions of distance, both with practical examples (and tests), and in the abstract.**
  - **Timing / Frequency - The study could be planned along the lines of a baseline survey, designed to be repeated at fixed intervals.**

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Thank You