EVALUATING EFFECTIVENESS OF INTERVENTIONS FOR AIRPLANE CARGO BAGGAGE HANDLING

Request for Office of Management and Budget (OMB) Review and Approval
for a Federally Sponsored Data Collection

Section B

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B. COLLECTION OF INFORMATION EMPLOYING STATISTICAL METHODS

For the current study, NIOSH will collaborate with the American Airlines (AA) to evaluate the effectiveness of two engineering control interventions for reducing the risk of work-related musculoskeletal disorders (WMSDs) among baggage handlers working in the ramp areas of airports. Two interventions including the power stow (PS) and the vacuum lift (VL) systems will be introduced to a study site for reducing the intensities of manual baggage handling. The engineering control systems will be evaluated through a prospective study design with a control group. The effectiveness of the interventions will be evaluated by reductions in self-reported musculoskeletal pain symptoms in multiple body regions (neck, shoulders, low back and knees), sickness absence, and worker compensation costs in a two-year study period. A cost-benefit analysis will also be included to determine a return on investment (ROI) in different terms, typically 5, 10 and 20 years into the future, using depreciation of the investments on the interventions and projected injury costs. Additionally¸ through the prospective study design, a potential exposure-response relationship between the WMSD physical risk factors and WMSD incidence, adjusted for personal and psychosocial factors, will be evaluated for airport baggage handlers.

B1. Respondent Universe and Sampling Methods

The target population (people, groups or workplaces which might benefit from the WMSD interventions being tested) includes 173,700 baggage handlers working at airports in the United States. The sampling frame (segment of the target population or respondent universe) includes private airline companies that have operations of narrow-bodied airlines (e.g., McDonnell Douglas or MD Super 80, Boeing 737 and 757) at 260 federalized airports in the United States. The study sample (people, work groups or workplaces chosen from the sampling frame) includes passenger airline baggage handlers working for the narrow-bodied planes, such as workers from the study partner AA. Because of the limited availability (3 units per intervention) of the engineering controls and limited personnel resources for the study, only a sample of workers at a large airport or study site is practical for completing this prospective study. Within the eligible population (sampling frame), a few airports have been identified as a potential study site by our study partner. The four targeted airports include the Dallas/Fortworth International airport (DFW), the Boston Logan International airport (BOS), the Los Angeles International Airport (LAX) and the Orlando International Airport (MCO). NIOSH plans to recruit 960 baggage handlers in the ramp area of DFW, a pre-selected airport (a study sub-sample) by our study partner. If the implementation of the engineering controls at the study site is not feasible due to logistic reasons, an alternative study site in the similar size or a combination of 1-3 study sites totaling the same sample size will be selected by our study partner to accomplish the study objectives.

A sampling strategy of complete randomization of baggage handlers nested in crew and shift will be used to recruit study participants at the selected study site. According to the general personnel structure of an airline company, 4-6 members on the same ramp ground crew work together as a team to share the baggage load at the same gate. They typically do not rotate to other gates during a shift. A crew member does not work with other members on a different crew unless he/she changes job or works overtime. Each intervention (Attachments E and F for PS and VL, respectively) will be permanently attached to one belt loader, or a location in which baggage handlers can share the intervention within the same crew. This existing work arrangement limits the recruitment strategy to crew rather than the strategy based on individual crew member. If the sampling based on each individual crew member is used, re-construction of their personnel system will be required, leading to an anticipated high refusal rate and possibly a refusal from the management. The rationale for the stratified sampling by shift is because of the limited number of interventions. To maximize the sample size with this constraint, each intervention unit must be shared by members on the same crew and used across two shifts in the same gate area.

B2. Procedures for the Collection of Information

NIOSH investigators will collect data over a 2-year study period. WMSD risks and rates will be collected on respondents in a study cohort at baseline, 1 and 2 years after implementation of two interventions. The effectiveness of the interventions will be assessed by a significant reduction in WMSD risks or incidence rates at the end of the two follow-up periods. Costs and benefits (i.e., cost savings for reduced WMSD cases) associated with using the interventions will be calculated in monetary terms in a cost-benefit analysis using company data.

To sample the study cohort, including one control group and two intervention groups, a stratified sampling method by crew and shift will be performed as described and justified in B1. Participating crews will be randomly assigned to one of two study groups. Table B2-1 shows the number of subjects to be recruited in each study group.

Table B2-1 Estimated sample sizes for three study groups

	Study group	Presence of intervention		*No. of crews to recruit	No. of participants to recruit
		PS	VL		
A	Control	No	No	103**	516
B	PS	Yes	No	6	30
C	VL	No	Yes	6	30

*estimated number of participant per crew=5

** approximate number using 5 individuals per crew

The sample size presented in Table B2-1 is based on power calculations for two main outcomes. For the first main outcome (i.e., LBD incidence rate), results from Norman's WMSD physical risk exposure study (1998) and the intervention study for TSA baggage handlers (Lu et al., 2014) were used. Norman's data, obtained from a 3-D biomechanical

model, are highly relevant to the biomechanical risk data to be used in this study. It is hypothesized that the cumulative spinal loads of participants in the control group (i.e., more risk exposure) and each intervention group (i.e., less risk exposure) are similar to the spinal loads in Norman's study, respectively. In the VL assessment study (Lu et al., 2014) the back compressive force for lifting a 40 lbs bag using the VL system showed a 63% decrease from 648 ± 126 (SD) to 262 ± 76 (SD) Newton (N). Using this reduction rate and estimated 50% of the daily work time a baggage handler spends on the ramp operation position #1, where the intervention VL will be used, an approximately 30% reduction in the total cumulative risk exposure is estimated. To match the estimated reduced cumulative risk exposure, the mean values of the two variables in Table B2-2 (data from Norman's study) are logically reduced by 30% to 2,396 and 325 from 3,423 and 465, respectively.

Table B2-2 LBD incidence related cumulative exposure variables over a shift (Norman et al., 1998)

Variables	N	Mean	SD
Peak cumulative back compressive (N)	104	3423	1421
Peak cumulative back shear force (N)	104	465	176

Table B2-3 shows the required sample size for detecting a statistically significant difference between the control and intervention group at different powers and confidence level (alpha) using the revised data in Table B2-2. Sample sizes of 26 and 32 per group are required for determining a statistically significant difference (type-α error 0.05 and power 0.8) in the back shear and compressive forces, respectively. A sample size of 30 is chosen based on the estimated sizes for the two risk variables and the limited number of intervention equipment (3 per intervention available for the study) that can only accommodate up to 30 participants in two shifts.

Table B2-3 Required sample sizes at different statistical powers with different alpha (confidence level) using the estimated cumulative back compressive forces as the main outcome variable.

Power (%)	Cumulative compressive force		Cumulative shear force	
	Alpha=0.01	Alpha=0.05	Alpha=0.01	Alpha=0.05
80	47	32	39	26
85	52	36	43	30
90	59	42	49	35
95	70	51	58	43

To determine the required sample size for the second main outcome (i.e., mean back compressive force across all tasks), results from the risk assessment of the VL system (Lu et al., 2014) were used. On the basis of the calculated mean of the back compressive force 648 ± 126 (SD) and 262 ± 76 (SD) lbs without and with the VL system, a sample size of 3 per group is required to achieve a statistically significant difference (type-α

error 0.05 and power 0.9) between the control and the intervention group VL. Typically, the ramp service workers spend about 50% of their work time on using the VL in one specific job position. Therefore, to account for the other half of the risk data variance, a doubling sample size of 6 would be sufficient to achieve the specified statistical power. Based on the estimated effects of the two main outcome variables, a larger sample size of 30 is chosen to achieve an appropriate statistical power for risk and incidence evaluations.

Since there is no incidence and risk data associated with the intervention PS (Attachment E), a sample of 30 is chosen as a pilot size to match the required sample size for the VL. This pilot size is reasonable because the PS system basically functions as the VL system to eliminate or reduce the intensities of manual lifting. In addition, it has the potential to entirely eliminate manual lifting because the power-assisted roller head of the PS system can be used to direct the bag to a designated stacking area without manual handling of the bag. A sample size smaller than 30 in the PS group is likely to be sufficient for detecting a statistical significant at power=80% and alpha=0.05. Therefore, the required sample size for the PS is a realistic estimate.

To assure that the sample size for the interventions groups is sufficient, refusal and drop-out respondents will be replaced by respondents from the control group. For the control group, because of the lack of WMSD incidence data in baggage handlers, the sampling strategy is to sample the entire working population in the ramp area at the participating airport to control for possible demographic and psychosocial effects. The number of ramp workers available for the control group is approximately 900 according to the study site (i.e., DFW) of our study partner. The sample size is estimated to be 516 after a consideration of a 40% reduction (combined refusal and attrition rates) in the sample size for the control group and estimated replacements for refusal and drop-out respondents (n=24) in the intervention groups during the study period. This means an estimated 60% overall response rate during the 2-year study period or an annualized 80% response rate. Table B2-1 summaries the final required sample sizes for the three study groups. The large estimated number of participants in the control group (N= at least 516) would allow the investigators to conduct effective paired statistical testing with the intervention group (N=30 each).

During baseline, the first and second year follow-up visits, a self-administered standardized questionnaire (Attachment I-1) will be used to investigate participants' work conditions, musculoskeletal health, personal, and psychosocial factors. A contact list for crew leaders of the baggage handlers working at the study site will be requested. Using the contact list, the NIOSH research team will visit the crew leaders to solicit participation using the informational flyer (Attachment N) posted at the work site and included in company newspapers. The total number of baggage handlers at these targeted airports is approximately 960 or 192 crews (5 members per crew). During the recruitment, the baggage handlers will be informed of study eligibility criteria including (1) free of WMSDs in the preceding months at baseline and (2) working on the same job at least 1 year. Eligible workers will be informed of human subject protection and the nature of the voluntary participation in the study. Workers who agree to participate in the

study will be given a written consent form (Attachment H-1) to sign, followed by the questionnaire for the annual survey. The consent form and questionnaire will be completed on the study site, primarily in the respondents' office or a private waiting area for each crew. They will be allowed to fill out the questionnaire during their work time. A separate questionnaire (Attachments J-1) containing a portion of the health questionnaire used for the annual survey will be mailed to respondents monthly. The purpose of the additional monthly questionnaire survey is to track participants' health and risk status to increase the accuracy of the effects of the interventions. For quality control, missing information from submitted surveys will be collected during follow-up phone calls with participants who submit incomplete surveys. This data collection is represented by Attachment P. Female participants who become pregnant will be disqualified from the study because MSD symptoms are common among pregnant women. To assure that surveyed MSD symptoms are work-related, exclusion of pregnant participants is necessary. A letter (Attachment Q) explaining such requirement for excluding pregnant participants will be mailed to disqualified pregnant participants.

Personal, job-related and psychosocial risk factors for WMSDs will be investigated by the annual and monthly questionnaires. To estimate WMSD physical risks, a biomechanical analysis using postural data in video recording and hand load information will be used. This degree of accuracy for the physical risks is needed because the mixed research results on WMSD are linked to gross estimations of the physical risks using questionnaire or observation data (Marras et al. 2010; Garg et al., 2013; Lu et al., 2014). The entire sample (N=60) of the intervention groups and a subset (N=30) of participants in the control group will be asked to participate in the physical risk exposure assessment by sampling video of participants' work. Prior to the video data collection, participants will be asked for permission for recording video (Attachment H-1 Item #15 Video/Photo release consent). Their physical risk exposure will be determined by the recorded video data using a video analysis method. This method employs a static (Chaffin et al., 1969, 1970, 1991) and a dynamic 3-D biomechanical models (Kingma et al., 1996; Chang et al., 2003; Xu et al., 2010).

For the above mentioned video analysis, one digital video camcorder (Sony model DSR – SR 300, Sony Inc.) will be used by a NIOSH researcher to record 10-20 minutes of video on each participant in the subset of the study groups to sample his/her entire session of baggage handling operations for each flight. The video sampling will repeat for the next flight until the participant finishes her/his work for the day. Because each baggage handler rotates between the different job positions between flights, each participant will have sufficient video data for the different positions. On average, each crew services about 4-5 flights per day. Therefore, the estimated total recording time for each participant will be approximately 70 minutes. During a separate day when video data is not collected, hand forces of each participant in the subset of the study groups for pushing/pulling baggage for 3 random flights (~100-200 measurements total) will be measured using a force gauge (Chatillon model MSC-200, AMETEK Inc.). There is no burden or interference with participants' work because the video data collection is conducted by the NIOSH research team.

To control the quality and increase accuracy of the physical risk exposure data, a weekly sampling method for the variations of baggage weights within a day and between days will be performed. NIOSH researchers plan on recording the weights of all checked bags to be loaded and unloaded by study participants involving the physical risk assessment during the first and second shifts, which account for the majority (>90%) of daily scheduled flights. This recording strategy will also include at-gate checked baggage (i.e., pink-tagged bags). To avoid any interference with their normal job duties, the measurements will be taken before and after the performance of required manual baggage handling tasks during a loading and unloading session for each flight. Because flight schedules are usually on a weekly basis, checked baggage weights will be recorded continuously for 7 consecutive days to investigate the typical baggage weight variation/distribution between weekdays. This baggage weight survey will be conducted at baseline, the first and second annual follow-up visits.

The physical risk data of participants in the subgroups will be used as the base for estimating the physical risk exposure of all study participants. To estimate the risk accurately on the individual level, the company's baggage on-load/off-load record system that registers baggage information for each flight will be used. The information including the number of bags and total weight of checked bags for each flight each crew will be used in combination with the working methods used by each participant reported on the monthly questionnaire survey (Attachment J-1). During the monthly survey, participants will be asked to answer the average percentage time spent on each position during a typical work day for estimating the total risk exposure levels. The monthly survey and company baggage records will allow NIOSH to capture variations of the WMSD physical risk exposure as accurately as possible. In addition, participants will be asked for their compliance of using the assigned intervention on the monthly survey as a data quality control.

The effectiveness of the interventions will be assessed first by a significant reduction in the WMSD incidence data, as compared with data for the control group, while matching their work method (sitting or kneeling in the cargo compartments). In addition, to decrease the unknown threat of individual factors (e.g., age, height, weight and sex) to the validity of the analysis for the smaller sample size (n=30) for each intervention group, data in each intervention group will be paired with participants in the control group by the additional individual factors. Since the study population for the control group is large (n=900), the likelihood of matching the participants by individual factors and work method would be high. A Chi-squared test at $p<0.05$ for significance or exact statistics if incidence rates are too small in the intervention groups will be performed at the end of the two follow-up periods. The analysis will be performed separately for different body regions using different case definitions (self-report, workers' compensation record, lost days, etc.). In a pooled data analysis combining data from three study groups, the effects of personal, physical and psychosocial factors on WMSDs will be evaluated using multivariate logistic regression models, resulting in an odds ratio (OR) at the end of each follow-up period. Based on the above statistical analyses, the researchers anticipate a significant reduction in the WMSD physical risk variables between the control and each of the intervention groups.

For the cost-benefit analysis, this study will focus on the economic impact on the employer resulting from workers' injuries and employer's investments associated with interventions for reducing the injuries over a specific term (Reville et al., 2001). A cost-benefit analysis model will be developed using a combination of Hendrick (2003) and Oxenburgh's (1997) models. Cost and benefit data regarding intervention and incidence of WMSDs will be gathered before, 1 and 2 years after implementation of the VL and PS. Indirect and direct costs associated with using the interventions will be collected from the company records. The collected data will allow a comparison of the net present values for the interventions. This cost-benefit analysis will have a component demonstrating a ROI in different terms, typically 5, 10 and 20 years into the future, using depreciation of the investments on the interventions and projected injury costs.

The study will require subjects in the intervention groups to use one of the two types of mechanical lifting assist systems. Prior to using the interventions, study participants will be required to complete a safety training guided by trained crew leaders and intervention providers to assure the proper use of the systems and the safety of the user. The training will also include emergency procedures established by the participating company for potential risks of injury.

If study participants leave their jobs during the study period, attempts will be made to contact them in order to determine whether those who leave the study are more or less likely to experience WMSDs. Participants who leave a study will be contacted by telephone. The telephone interview script (Attachment K-1 or K-2 for Spanish version**)** includes an explanation that the interview is voluntary and secure

B3. Methods to Maximize Response Rates and Deal with Nonresponse

Methods to Maximize Response Rate

This study is designed such that individual participants complete surveys at baseline and two annual follow-up visits. They will be also asked to complete a short survey every month to track their job exposure status and update on their musculoskeletal symptoms. Several methods (described below) will be utilized to maximize response rate.

Brief Survey: Surveys have been designed to be as brief as possible. Baseline time burden is estimated to be 30 minutes per participant while the time burden every month is estimated to be 10 minutes. It is estimated that the total time burden for each participant to complete the surveys including consent forms over the course of the 2 year survey study is less than 6 hours.

Focused Recruitment: At the company level**,** NIOSH will work closely with the participating airline company to recruit and retain participants using informational flyers (Attachments N and O). The flyers will be posted at the work site and included in company newsletters. During subject recruitment, the participating company will be

asked to provide a contact list for eligible baggage handlers working in the ramp area. At the individual level, the NIOSH research team will visit each crew leader and his/her crew members at every gate to begin recruiting baggage handlers using the informational flyer (Attachment O). It is anticipated that through such focused recruitment, a committed participant pool will be established and this will help maximize response rates once the study is underway.

On-site completion of annual questionnaire: Study participants will be asked to complete the annual questionnaire survey on site during their work time. They will be informed of the permission to complete the survey on site by their crew leaders or upper managers. The NIOSH research team will be at the study site answering questions regarding any confusion about the questionnaire. Because baggage handlers working in the ramp area have 3-4 30-min break time periods during their daily work hours, these opportunities increase the likelihood of completing the survey during their work time. The research team plans to stay at the same site for at least one week to complete the annual survey. If the participants have not completed and turned in the survey, follow-up visits will be made in the following days. The follow-up visits will help maximize the response rate.

On-site language assistance

If language is a problem for self-administering the survey, NIOSH provides a Spanish version of the data collection instruments (Attachments I-2, J-2, and K-2) and the consent form (Attachment H-2). If literacy is a problem, NIOSH will offer an on-site questionnaire administration with an option of Spanish or Chinese (two popular foreign languages) for English challenged participants. Two of the NIOSH research team members are fluent in these two languages. They can provide adequate level of language assistance at the study site. Similar literary assistance by phone will be provided for the monthly questionnaire survey.

Phone call prompts to complete monthly surveys: If the participant gives permission, participants will be sent phone call prompts to complete the monthly questionnaires. If no response is returned within 1 week of the scheduled data collection date, a second phone call prompt will be sent. If no response is returned within 3 weeks of the scheduled data collection date, a third phone call prompt will be sent. If no response is returned within 4 weeks of the scheduled data collection date, a fourth phone call prompt will be sent to the participant to inquire whether they wish to withdraw from the study. The phone script for monthly prompts will be as follows:

"You are participating in a CDC-NIOSH study. Your next scheduled data collection is now due. Please submit your completed survey XX within XX days. If you have any questions about your participation, contact NIOSH at XX."

Methods To Deal With Non-Response

The anticipated most likely reason why an individual will not continue to participate is that they have left employment with the participating firm or changes in their job location

(e.g., not in the ramp area). On the basis of the low turnover rate (10%) for baggage handlers working in the ramp area in 2012 per the potential study partner, continued response rates in excess of 80% are expected for this study.

As described above for the monthly questionnaire, if no response is returned within 4 weeks of the scheduled data collection date, a fourth email or phone call prompt will be sent to the participant to inquire whether they wish to withdraw from the study. If a participant misses 3 consecutive scheduled quarterly data collections, it will be considered that the individual has left the study. For participants who leave the study for any reasons, an exit interview will be used to ascertain whether the reason for leaving was MSD-related health problems (Attachment K-1 and K-2).

For statistical analyses, participant employees who drop out of the study will be excluded from the main analysis (e.g., for individual employee level MSD symptoms) and only replacements will be included. The baseline and time points for the replacement measurements will be shifted before any data analysis. Overall survey data will also be analyzed for consistency of response between participants. For example, participants may miss multiple data collections but can continue to participate as long as they do not miss 3 consecutive scheduled monthly data collections.

B4. Tests of Procedures or Methods to be Undertaken

Data Collection Forms

Estimates of time burden and usability for all data collection forms are based on recent pilot testing (involving 5 researchers) conducted at NIOSH and on prior studies (OMB clearance 0920-0551, which expired in 2005) that developed, validated, and utilized the data collection forms extensively (Water et al., 2010; Lu et al., 2014).

Annual Questionnaires (administered to all 960 participants at baseline and 2 annual follow-up visits; 30 minutes estimated completion time per data collection):

- Personal information: The first portion of the questionnaire is to collect personal information including first and last names, employee number (clock number), home address, phone number, demographic information and health behavior questions (17 items; Attachment I-1 Section A). Per the NIOSH pilot testing, the average time for completing this part was 3 minutes, ranging from 2-4 minutes in the pilot sample.
- Job information: The second portion is to collect work information including work history, job position, work arrangement, work hours and methods, information on the second job (15 items; Attachment I-1 Section B). Per the NIOSH pilot testing, the average time for completing this part was 5 minutes, ranging from 3-6.5 minutes in the pilot sample.
- Physical activity outside of work: This portion asks for physical activity that may confound with the main physical risk factors (i.e., manual materials

handling) (3 items; Attachment I-1 Section C). Per the NIOSH pilot testing, the average time for completing this part was 1 minute, ranging from 0.5-1.25 minutes in the pilot sample.

- Health information: The health information includes self-reported MSD symptoms, (Attachment I-1 Section D). This instrument has been found to have acceptability, high re-test reliability, internal reliability, and validity for low back pain and disability in multiple language translations. This instrument was used in a past NIOSH study that was granted OMB clearance (0920-0551). The average time burden for this instrument reported in the literature is less than 3 minutes per body region totaling 12 minutes for four body regions (neck, shoulders, low back and knees). Based on previous literature and a NIOSH pilot testing, it is estimated that a reasonable average time burden is 12 minutes for this part of instrument.
- Work environment: This portion is to collect work organizational and psychosocial factors related to the risk of WMSDs (36 items**;** Attachment I-1 Section E). This instrument has been found to have reasonable re-test reliability, internal reliability, and validity for many health outcomes including WMSDs in multiple language translations. Per the NIOSH pilot testing, the average time for completing this part was 9 minutes, ranging from 7.5-12 minutes in the pilot sample.

Monthly Questionnaires (administered monthly to all 960 participants after the baseline assessment; 10 minutes estimated time for completion per data collection):

- This short questionnaire (Attachment J-1) will collect personal, work information, and health outcome related to musculoskeletal pain symptoms. The questions for the pain symptoms are identical to those in the annual questionnaire with high reported reliability and validity in previous studies. Based on the NIOSH pilot testing, it is estimated that a reasonable average time burden is 10 minutes for this monthly survey.

Early Exit Interview (administered to participants that exit study; 5 minutes estimated time for completion per data collection):

- This interview will be administered to all participating employees that exit the study before the end of the 2 year follow-up period. An estimated 20% dropout rate (192 participants) may exit the study during the study period. Public reporting burden of this collection of information is estimated to be average 5 minutes per data collection, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed and completing and reviewing the collection of information

B5. Individuals Consulted on Statistical Aspects and/or Analyzing Data

NIOSH personnel primarily design the data collection methods, and will perform the data collection and analysis. It is anticipated that contracted secondary support staff (to be determined) will also aid NIOSH in these data collection and analysis tasks. The NIOSH personnel involved in the study design and data collection are listed in Table B5-1.

Table B5-1 NIOSH research personnel

Name	Job Title	Division	Contact Information	Roles in Project
Ming-Lun Lu Ph.D.	Research Industrial Hygienist	Division of Applied Research and Technology (DART)	uzl5@cdc.gov 513-533-8158	Project Officer: Study design, data collection and analysis
Edward Krieg, Ph.D.	Statistician	Division of Applied Research and Technology (DART)	erk3@cdc.gov 513-533-8160	Study design and statistical analysis
Tapas Ray, Ph.D.	Economist	Office of Director	cvt1@cdc.gov 513-533-8627	Study design, data collection and analysis
Dwight Werren, Ph.D	Computer Specialist	Division of Applied Research and Technology (DART)	dmw2@cdc.gov 513-533-8191	Data collection and analysis

Two external consultants (Dr. Chien-Chi Chang and Dr. Akinori Nakata) were consulted and will serve as consultants for data analysis and interpretations of study findings. Their expertise and contact information are shown in Table B5-2.

Table B5-2. External consultant and study collaborators

Name	Job Title	Division	Contact Information	Roles on Project
Chien-Chi Chang, Ph.D.	Biomechanics Specialist	Dept. of Industrial Engineering & Engineering Management, National Tsing Hua University, Taiwan	Max.Chang@ie.nthu.edu.tw +886-3-574-2942	Consultant for data analysis and interpretation of study findings related to biomechanical measures

Akinori Nakata, Ph.D.	Professor, Epidemiologist	University of Occupational and Environmental	nakataa@health.uoeh-u.ac.jp +81-93-691-7457	Consultant for data analysis and interpretation of study findings related to psychosocial factors and epidemiological questions