Reviewer's report

Title: Household smoking and dental caries in schoolchildren: the Ryukyus Child Health Study

Version: 2 Date: 22 April 2010

Reviewer: Melbourne Hovell

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Recommendations for publications: This is a large scale survey study of dental carries in children and their relationship to Second Hand Smoke exposure (SHSe). This study provides appropriate multiple variable analyses of the relationship between SHSe and carries after control for demographic and other possible confounding variables appropriate for a cross-sectional design. While there are minor methodological concerns and some important discussion issues that might be added to this manuscript, it meets my standard for methodological fidelity and significance to the health of children. I recommend that the editors accept this study for publication after minor refinements in methods and the preparation of the manuscript.

Critique:

Purpose and significance. This study offers a remarkably large sample of Japanese children as participants of a study if dental carries and their relationship to Second Hand Smoke exposure (SHSe). As such this study offers findings for an Asian culture and for dental health uniquely that suggests that tobacco smoke exposure may have an etiological role in the development of carries. This adds to the cumulative evidence of the likely harm due to tobacco smoke and more importantly due to SHSe. As such the study offers a remarkably large epidemiological study of considerable significance for dental health and also contributes to the wide range of biological systems that appear to be damaged by tobacco smoke, including passive exposure.

Methods. This study employed a cross-sectional design to test hypotheses about SHSe and dental carries. The sampling procedures and size are major strengths of the study offering sufficient power to detect relatively small effects in children but effects that may have life-long impact on their dental health that might have been avoided had the children been protected from SHSe. Since children exposed as children are very likely to be exposed for much of their life, the cumulative exposure and the risks for premature morbidity and mortality are likely to be arithmetically greater than estimated by this study, making the estimates observed conservative.

Measures. In general, this study offers reasonable measures of reported SHSe and dental carries, based on the observation of a clinical dentist. The only concerns raised about measures pertain to possible refinements in the quality assurance or fidelity of some of these measures. First, the measures of dental
carries might be strengthened if a subsample of the children’s findings for carries could be compared to dental chart records or even a second dental examination by another dentist. These types of checks would provide evidence of reliability if not validity. While the dental examinations offer considerable face validity, absent X-ray confirmation there may be an under-estimate of carries and it is not clear how this might alter the association with SHSe. Use of dental charts also might offer the opportunity to confirm number of carries in a subset of children for whom X-ray information is the dental chart. If this sort of reliability check is possible, I suggest it be considered for a nominal subset of the children selected at random.

The variables employed included age and other factors that may be presumed to be count variables, if not continuous. However, most variables were converted to ordinal measures without clear rationale for doing so. If these measures were highly skewed and could not be adjusted to a normal distribution, the authors should explain this and how the final ordinal measure offered a more reliable measure than would be true as a count or continuous variable. This issue is of some concern due to the loss of precision and power true for continuous variables that are reduced to ordinal or dichotomous variables. This issue pertains to both independent and Dependent variables.

Results and discussion. The results are overall quite clear. However, in the context of a modest proportion of youth who did not participate, and in the context of education and other factors likely associated with failure to participate, the authors should explore the likelihood of under-estimates of carries (for their prevalence results) or at least add discussion of this issue. The loss of children at higher risk for carries and SHSe also raises an concern that the results may under-estimate the strength of the association reported. Thus, this too should be discussed.

The Discussion section should make clear that there is now sufficient evidence and biological plausibility for concern that SHSe may contribute to carries in children. They authors also should outline follow on studies that might confirm these findings in the context of methodological improvements in the research design and fidelity.

Larger issues for Discussion. Following traditionally conservative research culture, cross sectional and other non-experimental studies always are reported in tempered language and conclusions are restricted in scope and scale. However, this can be a risk to a special form of Type II error. The current results add to a growing list of biological and behavioral risks to children and/or adults with exposure to SHS. Thus, the biological and behavioral plausibility for an etiological relationship is quite high. In this context, the authors are encouraged to discuss the importance for dentists to be involved in routinely screening youth for SHSe and counseling avoidance for older children and counseling parents to establish no smoking bans in their home. Formal controlled trials of dental counseling of this nature might also be recommended as one of the strongest and quickest means of showing a “causal” relationship between SHSe and dental carries by demonstrating a protective effect when prevented. Thus, while all of
the normal limitations of cross-sectional designs should be acknowledged, this study should also offer direction in the follow on science that might confirm causal relationships while also testing services to prevent the likely effects of SHSe.

Minor issues. The term ETS is reportedly a product of the Tobacco Industry to move the attribution from cigarettes to a more general environmental source of smoke exposure and thereby protect the Industry. Many of the investigators involved in SHSe have adopted second hand smoke exposure (SHSe) as the preferential name. I recommend that be done for this paper too.

While the rate or smoking among young children is likely quite low, the study should attempt to identify smokers and eliminate them from the analysis or discuss why this is not possible.

While region of residence was one of the control variables it is not clear how this coincides with city. Since two cities were employed it should be made clear how these were similar or different and then how the control for region of residence controls for city influences. This could be conceptualized as a cluster effect for which control for cluster effects would be important. However, this is not likely to provide a big influence given the likely similarity between city populations.

Regardless of how city may have been included in the current analyses, it might strengthen the results to replicate findings within each city independently. If patterns are the same, even if the power to detect significance is compromised especially in the smaller population from one city, this might offer an internal test of generalizability.