

**NIOSH***Testimony to DOL*

NIOSH Comments on OSHA
Proposed Stay for Knitting Operations
Cotton Dust Rulemaking
Docket H-052D
1 September, 1982

In response to the request of the Occupational Safety and Health Administration (OSHA), NIOSH has reviewed the final report of "Analysis of Pulmonary Function Data of Knitting Industry Workers" by Drs. Brian Boehlcke and Mario Battigelli of the University of North Carolina.

NIOSH concludes:

1. The authors were very thorough and clear in the methodology over which they had control and in their presentation of data which show generally negative results. The authors had no control over the selection of the study plants and could not fully assess how representative the study population was to the population in the entire knitwear and hosiery industries.
2. There may be some evidence of dose-response, which may be worth following if these subjects are ever re-evaluated.
3. The accuracy of "years worked" is questionable and may affect the regression analyses in which it is used.

4. There may be a strong selection bias, not under the control of the investigators, of which OSHA must be cognizant, which throws into question the generalization of the results of this study to the entire knitwear and hosiery industries.

The Occupational Safety and Health Administration had requested that NIOSH review the final report on the symptom and pulmonary function data analysis submitted to Cotton, Inc. by Drs. Boehlecke and Battigelli of the University of North Carolina. In this report these investigators reviewed pulmonary function data given to them from 12 knitwear and nine hosiery plants, all of which contract their medical services to ELB Associates of Chapel Hill, North Carolina. The investigators had no involvement in the selection of these plants as their study group.

In total, after careful editing of the raw data, 2287 individuals were studied. In addition, since a very critical exposure index, years in the industry, was not originally provided to the investigators, they attempted to obtain this information. Seven knitwear and seven hosiery plants provided them such information, for a subset of 1416 individuals. After editing, this number was reduced to 1396.

All in all the investigators edited the data they were provided very carefully and compared them to each other and to data from appropriate comparison groups from the literature. Thus NIOSH concludes that the methodology that was under the control of the investigators was

excellent. Of course, it would have been better if all the companies had provided all the job-tenure information that was requested. However, the investigators showed clearly that this "subset" of 1396 workers did not differ markedly from the total "dataset" of 2287 workers.

In general the investigators found "negative" results, i.e., there was no clear and convincing evidence that the knitwear and hosiery workers in this study were subject to adverse health effects due to occupational exposure. This conclusion was borne out by the relatively low prevalences of symptoms and by similar FEV₁ prediction equations to those of two commonly cited community-based "normal" studies by Knudson and Morris. Comparisons within the knitwear/hosiery worker study group in general failed to show any relationships of exposure to symptoms or changes in pulmonary function. NIOSH generally concurs with these observations, except perhaps in the interpretation of Table 22.

In Table 22, the investigators established an index of exposure based on elutriated dust exposure and stratified the study population into three exposure categories and by sex. They found that for both males and females (white subjects only) there was evidence of a trend toward larger percent shift decrements in FEV₁ as dust index increased. This trend is more marked in women than in men, although for the latter the investigators re-worked this comparison by removing five male subjects with suspiciously large shift changes in FEV₁ (both positive and negative), thereby negating the trend. It appeared to NIOSH to be

- 4 -

inappropriate to eliminate these five individuals, since their data were already considered technically acceptable by the investigators' very rigorous criteria. Thus one must assume that their shift changes were as "real" as the others. It is true that the trends seen in this Table are small and are probably clinically insignificant, but they are interesting. Similarly, in Table 25B of the report, there is a trend toward decreasing pre-shift FEV₁ in young (less than or equal to 30 years old) workers as their tenure increased. Smoking status is not taken into account, because of small numbers, which may account for this trend. If these workers are ever restudied it would be interesting to see if these trends persist.

In Table 27 of the report the investigators analyzed the "subset data" by regression analysis, using as an index of exposure "years worked in knitting or hosiery industries." This Table presents more clearly than the comparable table in their interim report the evidence that for the most part age, height and pack years of smoking significantly affect FEV₁, but that "years worked" does not. This may very well be the case, but how correctly the companies were able to respond to the investigators' questionnaire about "years worked" is not made clear in the study. These companies were asked to supply information on length of time of employment (1) within their present place of employment, (2) within the knitting or hosiery industry but at other places of employment, and (3) in other cotton industries such as textile mills. Did the management of the fourteen responding plants actually search

their personnel files or did they make "educated guesses"? How accurate would their data be on employment outside of their specific plants? Readers of this study have no sense of the accuracy of this important factor in the regression model.

Finally, as the investigators state, they were not involved in the selection of the study sample. Although they attempted to compare their study group with the knitwear and hosiery industries as a whole, they did not and probably could not assess the ability to generalize the results to the industries as a whole. This sample represents 21 plants which, perhaps for geographic reasons, chose as their medical contractor a very capable firm which provides technically accurate data. These companies also did their medical surveillance even though the cotton dust standard for them had been stayed. Thus, there is laudable voluntarism on their part, which may be mirrored in other aspects of their management (work practices, modern equipment, etc.) and which may not be typical of other knitwear and hosiery manufacturers.

6202
12

REPORT DOCUMENTATION PAGE		1. REPORT NO.	2.	PB90-193699	
4. Title and Subtitle NIOSH Testimony on Knitting Operations, Cotton Dust Rulemaking, September 1, 1982				5. Report Date 82/09/01	
7. Author(s) NIOSH				8. Performing Organization Rept. No.	
9. Performing Organization Name and Address NIOSH				10. Project/Task/Work Unit No.	
				11. Contract (C) or Grant(G) No. (C) (G)	
12. Sponsoring Organization Name and Address				13. Type of Report & Period Covered	
				14.	
15. Supplementary Notes <i>National Institute of Occupational Safety and Health</i>					
16. Abstract (Limit: 200 words) This testimony concerned the (NIOSH) review of a study of pulmonary function data for knitting industry workers. Pulmonary function data provided by a medical service for workers from 12 knitwear and nine hosiery factories in North Carolina had been reviewed. Altogether, 2287 workers were studied; for a subset of 1396 workers from seven knitwear and seven hosiery factories. Information on years in the industry was provided by the factory. An index of exposure to cotton dust based on elutriated dust exposure indicated that there may have been a trend toward larger percent shift decrements in pulmonary function as dust index increased. The authors of the original study had concluded that there was no convincing evidence that the workers were subject to adverse health effects due to occupational exposure. Years worked was not found to correlate with pulmonary function. Based on an analysis of this study, NIOSH concludes that the researchers had no control over the selection of the factories studied and were not able to assess fully the representativeness of the study population. The methodology over which the researchers had control was properly applied, and the presentation of data was thorough and clear. It was possible that there may have been a dose response, but only a reevaluation of these subjects would clarify this. Because the information on years worked was supplied by the factories, the accuracy of the information could not be determined. The facilities studied may not have been typical of knitwear and hosiery factories, so that the results could not be applied to the industry as a whole. ←					
17. Document Analysis a. Descriptors					
b. Identifiers/Open-Ended Terms NIOSH-Publication, NIOSH-Author, NIOSH-Testimony, Textiles-industry, Occupational-exposure, Epidemiology, Cotton-dust, Pulmonary-function, Respiratory-system-disorders					
c. COSATI Field/Group					
18. Availability Statement			19. Security Class (This Report)		21. No. of Pages
			22. Security Class (This Page)		22. Price

1000

1000

1000